

SUPPLEMENT.

The Mining Journal, AILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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2342.—VOL. L.

LONDON, SATURDAY, JULY 10, 1880.

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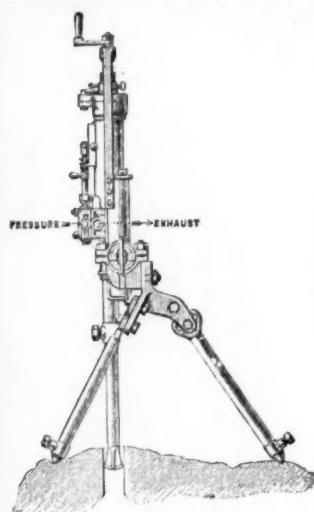
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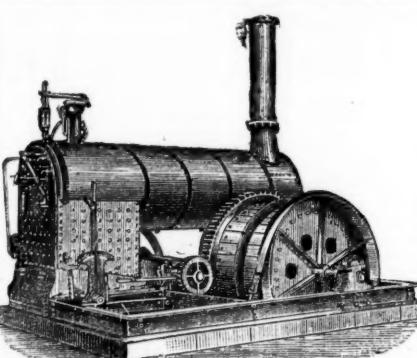
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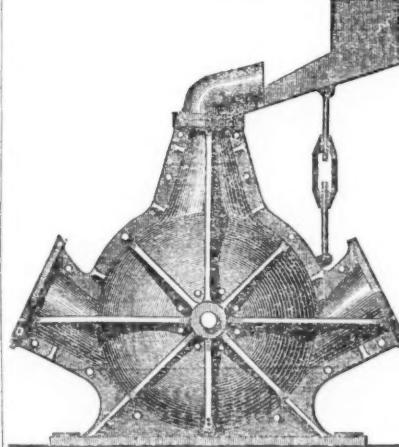
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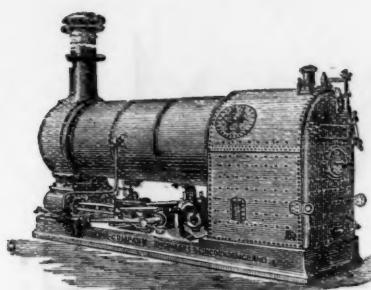
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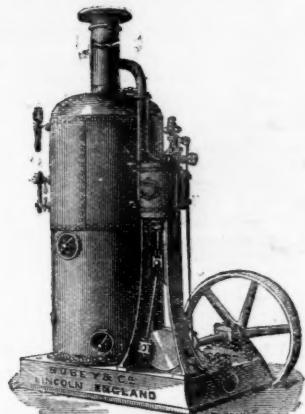
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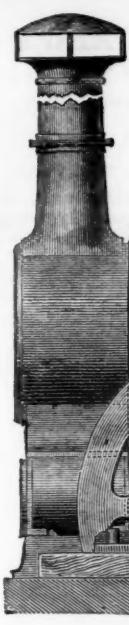
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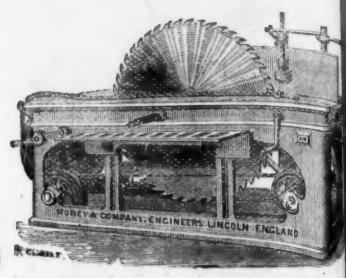
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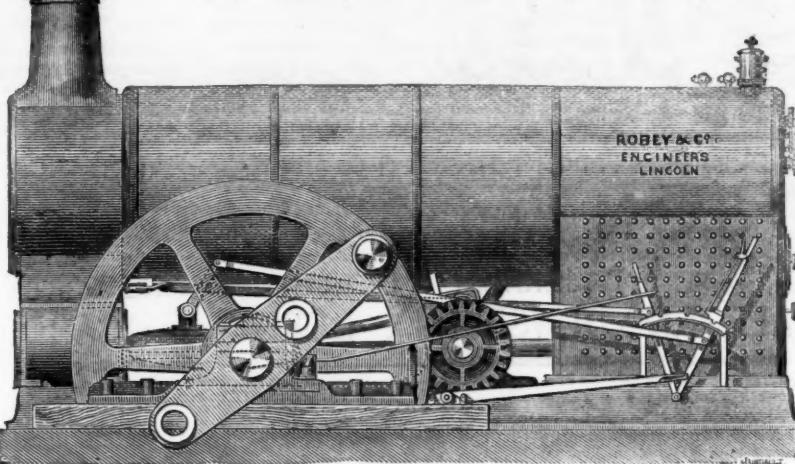
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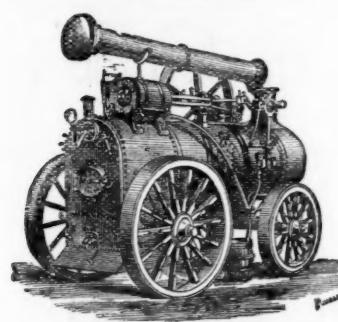
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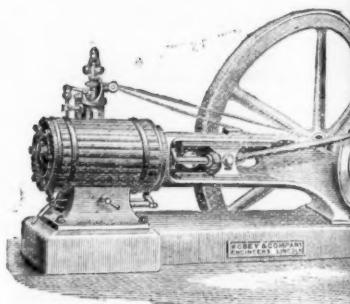
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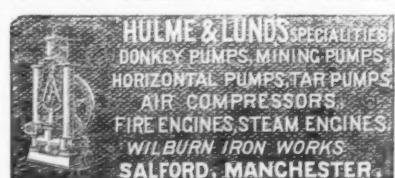
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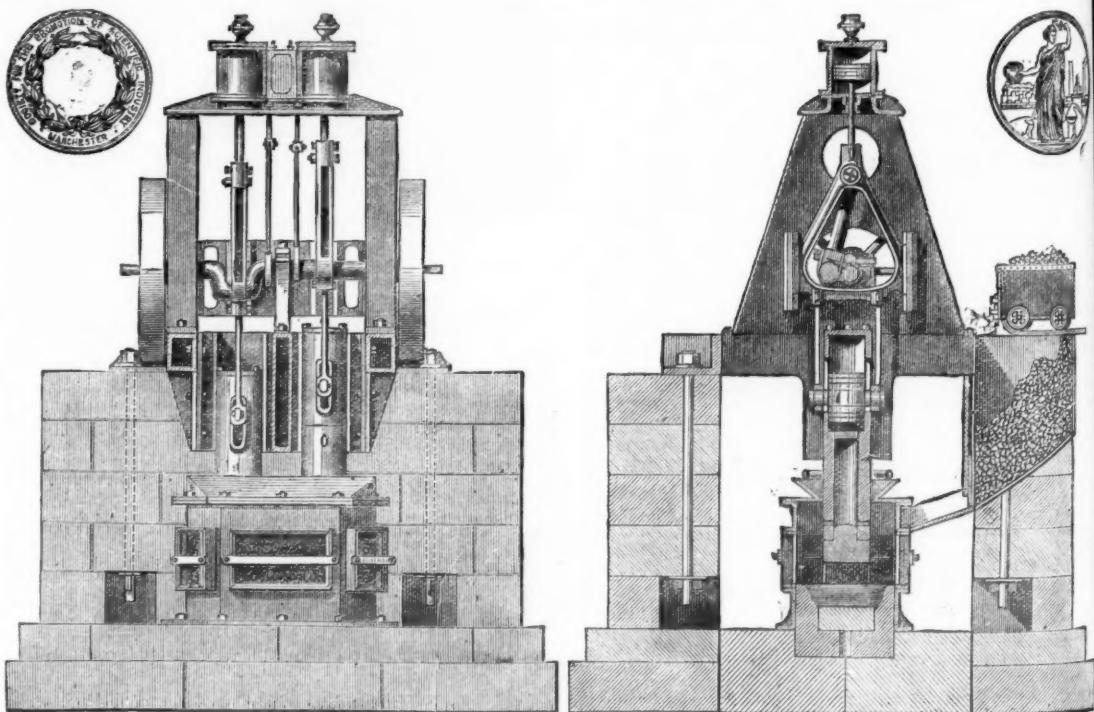
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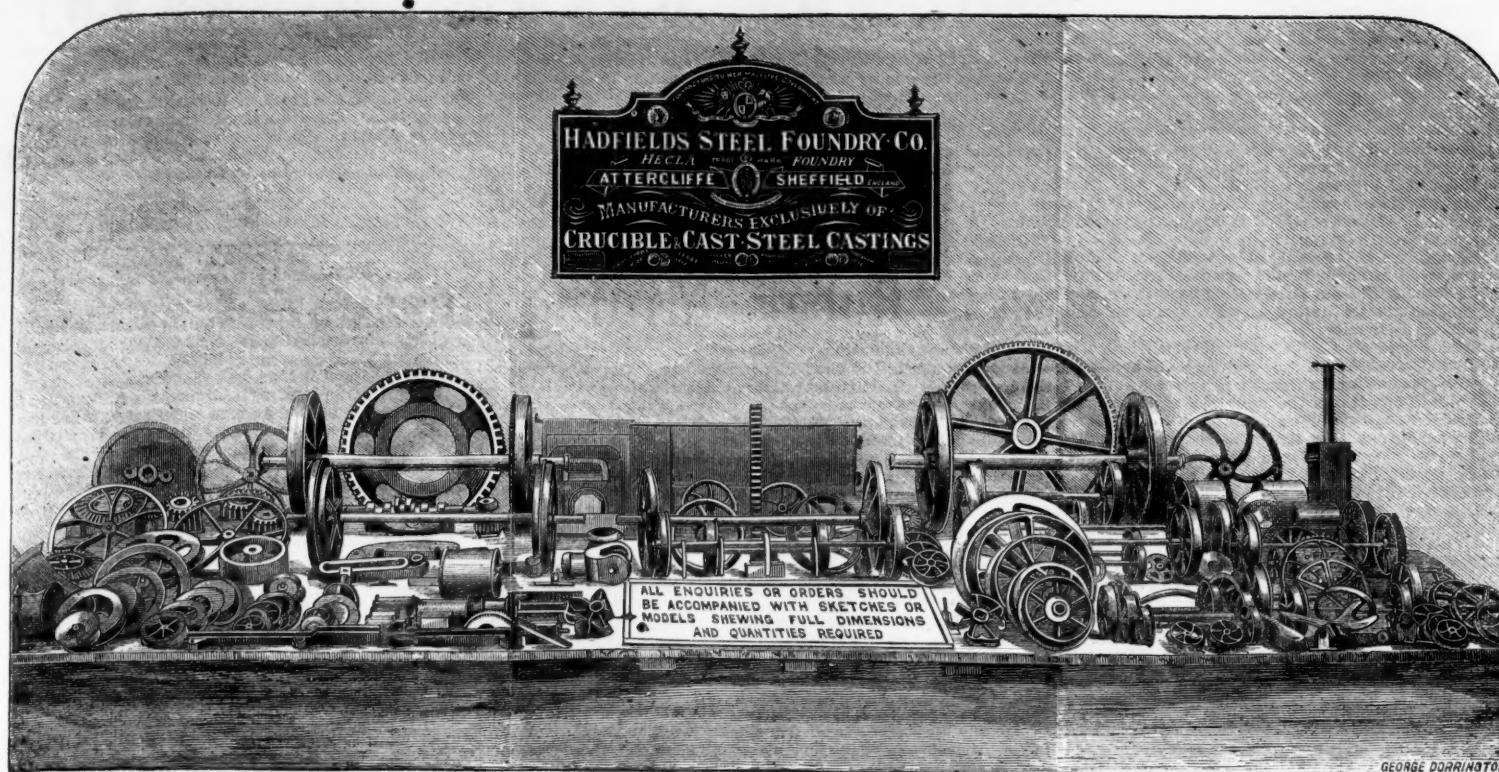
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IMPROVEMENTS IN WHEELS AND PULLEYS.



GEORGE DORRINGTON

THE SYDNEY EXHIBITS OF THE HADFIELD STEEL FOUNDRY COMPANY.

IMPROVEMENTS IN WHEELS AND PULLEYS.

Probably no growth of modern times has had such a stimulating effect upon the mechanical industries as the rapid development of railway enterprise which has characterised the latter half of the present century. It is certain that but for the increased demand which has given rise to improved appliances for conveying passengers and goods from place to place the list of modern inventors would lack many of the names that adorn it, and would be shorn of much of the glory which it has contributed to the history of civilisation. That modern necessities should have given rise to keen competition amongst improvers of railway appliances and machinery, as well as amongst inventors in other branches of mechanical industry, is not to be wondered at, and much less to be deplored. Hot controversies, which have nothing to equal them in the domains of politics, philosophy, and religion, agitate the railway world in this age of telephones, Atlantic cables; and no invention, whatever its merits may be, can hope to achieve success unless it have vitality enough to carry it through a whole literature of criticism and polemic. The battle still rages between the merits of coupled and single engines; between self-acting vacuum, mechanical, and pneumatic breaks; and between a host of inventions which contemplate needed improvements in railway appliances and systems of works. There is probably no light so fierce—certainly none so healthy in its influence—as that which beats upon railways; and while directors continue to be enterprising, inventors numerous, the travelling public will reap the advantage of increased safety and comfort in their journeys over the iron road. But while controversy may choose for its legitimate object most of the inventions which, while in perfect agreement as to the end sought, only differ from each other with regard to the means by which that end is to be attained, there need be no difference of opinion where inventors, proceeding upon generally recognised principles, introduce improvements which afford little or no scope for variety of method. Increase in the durability of machinery, for instance, is always a desirable end; and in the case of railway appliances, the demand for improvement in this direction is one of paramount importance. Directors may hold a variety of opinions regarding the comparative remunerativeness of goods and passenger traffic, or the degree to which various kinds of break action influence the wear and tear of line and rolling stock; but they are quite agreed as to the desirability of giving the maximum amount of strength and durability to all kinds of railway machinery.

The credit of fostering this very praiseworthy tendency on the part of railway companies must be distributed over a tolerably wide area, but much of it is due to firms like the Hadfield's Steel Foundry Company, who, by dint of careful experiments, inventive skill, and practical knowledge of all kinds of machinery, have succeeded in introducing a number of very valuable improvements of the character under discussion. The company named have obtained a well-deserved reputation for crucible and cast-steel castings, and one of the latest specimens of their skill has just been turned out from their Sheffield foundry in the shape of a new railway wheel, which has come to be widely known as the "Hecla" (Hadfield's Patent). When it is stated that the new wheel is made in one piece of the very best steel, it will be quite easy to understand that it possesses advantages to which ordinary wheels can lay no claim. The "Hecla" steel wheel has much more than the usual elasticity of railway wheels, and being better capable of withstanding shocks, and resisting the sudden application of brake power, is practically indestructible. Wheels have their lifetime like individuals, and, as in the case of human creatures, much depends upon the way in which they have been made up, as well as upon the materials of which they are constructed. The "Hecla" wheel is made so as to utilise the whole of the steel into the wheel tread. Under the old system—a system greatly in vogue even now—only a small portion of the tyre could be utilised for actual wear, and the wheel had to be its periphery, secured by fastenings, which are always in danger of getting loose, stretching, or bursting in the course of ordinary wear. The "Hecla" steel wheel has no tyre fastenings, and the tyre may be worn down to the wheel centre without any of those accidents to which the tyres of ordinary wheels are subject. Even when the steel tread is completely worn out, by turning off the flange to the level of the tread, a new tyre can be sunk on or fastened thereto, thus making a new wheel of the old one, with the result of great economy, and a practical doubling of the life-period of an ordinary tyre. The "Hecla" steel wheels are extremely graceful in appearance, and with immense strength, non-liability to breakage at points and crossings, and great durability, they combine that desideratum of railway machinery, extreme lightness. Before bringing this paragraph to a close it should be stated that the Hadfield's Steel Foundry Company have also produced a superior class of tramway-car wheels, which possess all the advantages claimed for the railway wheels just described. The extreme hardness of great changes in tramway locomotion give exceptional importance to improvements of the kind under notice, and from the success which they have already gained, one would be inclined to augur an important future for the "Hecla" steel tramway carriage wheels. Best cast-steel is used in the construction, and the wheels are only half the weight of American wheels.

Another speciality of the Hadfield's Steel Foundry Company is the manufacture of steel rollers and pulleys for use in mining or other engineering operations, and wherever wire ropes and chain are employed. Much of the cost of renewing plant in collieries, ironstone mines, lead and copper mines, quarries, &c., is made up of expenses

caused by the rapid deterioration of the wires, cables, and ropes used in hauling and transmission of power from point to point. The rope used is two often made the scapegoat for a large expenditure under this head, while the real cause of the deterioration—the friction of the rope against metal rollers which through wear and imperfections, have become unequally thick and lob-sided—is too often overlooked. The steel rollers and pulleys, manufactured at the "Hecla" foundry, are not only extremely light, lessening the strain upon the ropes, and effecting a great saving in haulage power, but they are equally balanced, not lob-sided, and revolve readily when touched by the rope. It is claimed for them that though from one-third to one-half lighter than cast-iron, they cannot be broken by any of the ordinary shocks to which rollers and pulleys are liable. Moreover, each is guaranteed to outlast about twelve of the ordinary iron rollers, the wear and tear being reduced to an absolute minimum. For the manufacture of these wheels the company have a specially adapted department, capable of turning out 2000 wheels per week. They have also brought out, in connection with this department, an interesting invention in the shape of a new method of fitting wheels upon axles, by which a much lighter and stronger wheel and axle may be employed, and a more reliable and cheaper fastening obtained than by any other process. By the ordinary method of fastening wheels upon axles, wedges and keys of various kinds become necessary, and the fitter frequently has to resort to boring and slotting, and to the use of iron hoops, cotters, bolts, nuts, washers, collared axles, &c. It is hardly necessary to state that almost all systems of keying and wedging involve the disadvantage of gradual loosening of the wheel and axle. In the method under notice, however, the appliances named are altogether dispensed with. The axle holes in the bosses of the wheels are, for a short distance, cast round, the remaining and greater portion being left a slightly tapered square. The axles are forged from plain round bar to a corresponding shape at each end, and then, by means of powerful machinery, the wheels are pressed upon these square ended axles, and are afterwards slightly riveted—a method which gives extra strength to the axle entering the boss of the wheel. In the case of wheels fitted for outside bearings a similar method is adopted, with the exception that the axle holes and the bosses are octagonal in shape, with axles forged to suit, and project upwards, instead of being riveted up. Wheels or axles wearing out, bending or breaking, can easily be unfitted and replaced. Some idea of the superiority of this method may be gained when it is stated that upwards of half a million of wheels and axles fitted by Hadfield's patent fast method are now in daily use in Great Britain and abroad without any breakages.

The problem of oiling wheels when once in work offers many difficulties for solution. By the old system of lubricating loose wheels much of the oil used fails to reach the wearing surfaces; and when once these become dry the bosses of the wheels and axle bearings grind each other, causing great wear and tear and consequent expense. All these defects are remedied by "Hadfield's patent self-oiling steel wheels," which are, by their construction, specially adapted for collieries, ironstone mines, slate quarries, lead and copper mines, and all processes where loose wheels revolving upon their own axles are required. By the new method the part of the wheel which immediately surrounds the axle is made hollow; the cavity is supplied with oil through a charging screw, and the lubricating material obtains access to the axle through a continuous opening on the inner side of the hollow chamber. This method secures a saving in the grease or oil used, the consumption being about two-thirds less than that involved by any other method. The oil is drawn out as required by the revolution of the wheel, and the moment the motion stops the lubricator ceases to act. When wagons are not in use, it is impossible for the grease to escape; nor can there be any waste in whatever position the wagon may be when discharging its contents. A single charging with lubricating material suffices for several weeks with continuous work. Being made of crucible steel, the wheels unite great durability with extreme lightness, simplicity of construction, and non-liability to get out of order.

In concluding this notice, it should be stated that the Hadfield's Steel Foundry Company were awarded the only gold medal at the Paris Exhibition of 1878 for crucible steel castings, the first prize medals at Leeds, Manchester, and Wrexham Exhibitions of 1875-6, and the highest award at the Mining Institute of Cornwall in 1877. Their latest triumph has been gained during the present year in the shape of the first prize awarded (gold medal) to them at the Sydney (New South Wales) Exhibition. In connection with this latter award, we have great pleasure in giving our readers an engraving (prepared from a photograph taken on the spot) of the Sydney exhibits of the company. It may be as well, after giving prominence to details of construction and to the objects kept in view by the makers of Hadfield's steel wheels, to refer to the experience of those manufacturers, firms, and companies who have put the new wheels to the test of a very severe trial extending over a number of years constant work. The decreased haulage power which accompanies their use has proved one of the most satisfactory features of working with these wheels, and in the case of large collieries, with a daily output of 800 to 1000 tons, the saving effected is not only considerable but surprising. In consequence of the extreme lightness of their construction, tram wagons made of iron and steel have begun to be largely used in preference to the old wooden wagons, with their cumbersome and heavy wheels of cast-iron. In regard to durability it would be difficult, almost impossible, to estimate the wearing life of these wheels. The

company, though running wheels in the North of England that have been in use upwards of ten years, have never known of any being worn out. This statement would justify scepticism were it not supported by the most unquestionable and convincing testimony. In one case a set of 9 in. wheels and axles fitted by Hadfield's patent fast method, after running 41,000 miles, carrying nearly 10,000 tons, and being in constant work for five years, were found to be worn little more than $\frac{1}{8}$ in. on the tread! In another case a contractor's wheel, 30 in. diameter, which ran 11,000 miles, and carried 33,000 tons of earthwork, was only worn $\frac{1}{8}$ in. on the tread! These are two examples out of thousands of cases in connection with which the company are prepared to furnish authentic references. Of the strength of the wheels, the most astonishing evidence has been given. They have come uninjured out of such serious mishaps as collisions, runaways down inclines, &c. In one case a set of wheels fell from the top to the bottom of a shaft 1320 ft. deep, and were practically undamaged. This firm has in work daily nearly 900 sets, and though the majority of these have been in use for over four years, no breakage from any cause has yet occurred. In regard to Hadfield's patent method of fitting wheels upon axles, it should be stated that the new system has successfully stood the crucial tests applied to it during the many years in which it has been in use, and that none of the wheels according to this patent have ever come loose or been rendered unserviceable by any of the ordinary accidents of working. Of the patent self-oiling or lubricating wheels, it will suffice to say that the thousands now at work are giving great satisfaction, and are effecting a saving of from 20 to 50 per cent. in the quantity of lubricating material used previous to their adoption. This company also supply all classes of general steel castings from 10 lbs. up to 5 tons in weight.

NEW EXPLOSIVE COMPOUND.

A composition consisting of 3 parts of nitro-phenol, with 15, 9, or 3 parts of chlorate of potash, and 3, 2, or 1 part of coal tar or mineral tar, the first proportions being very strong and the others less so, has been patented by Mr. MAX TSCHIRNER, of San Francisco, California. In using these ingredients the nitro-phenol and chlorate of potash are first ground to a proper degree of fineness by titration in a mortar or other utensil for the purpose, and then intimately mixed with the coal tar by stirring separately the fine nitro-phenol first and the chlorate of potash afterward therein, by which a product is formed having about the consistency of dough, but much tougher and stronger. In place of the chlorate of potash the perchlorate, manganate, permanganate of potash, or other alkaline base may be employed in about the same proportions as above set forth, to provide a stronger or weaker explosive according to the nature of the work to be performed. By this means he provides an explosive compound which is not affected by moisture, dampness, or water, and one that can be exploded under water. The coal tar holding and surrounding the particles of nitro-phenol and chlorate of potash mechanically prevents all moisture from penetrating the mass. He explodes the compound usually by a percussion cap in the usual way, but it may be exploded by fire applied in the usual way and manner, which is too well known to need explanation in this connection.

But the great recommendation of the explosive is the purity of the evolved gases. Mr. Tschirner has found by repeated experiments that the foul gases so incident to the explosion of other compounds, especially in mines, and which is so dangerous to human life by the generation of nitrous or noxious gases, are not present in the explosion of his compound, which fact enables the miner to remain without injury in the tunnel or mine with impunity after a blast has been let off. Furthermore, the ingredients separately or in themselves are absolutely in explosive, and consequently the manufacture is divested of much of the danger so incident to the manufacture of other explosives.

It should here be observed that an increase of heat or temperature will not produce spontaneous combustion of his compound as in case where picrate salts enter the combination as one of the ingredients in the manufacture of explosives, and hence he does not wish to employ picrate salts. He is aware that explosive compounds consisting of chlorate of potash with earthy and other substances as a base have been used. He is also aware that adhesive substances, such as asphaltum or a non-absorbent compound, have been used to coat the grains of powder when formed, but is not aware that nitro-phenol has been used in combination with any other ingredient whatever as an explosive, or that the other two ingredients of this composition have been used together.

CORNISH PUMPING-ENGINES.—The number of pumping-engines reported for May is 16. They have consumed 1685 tons of coal, and lifted 12.5 million tons of water 10 fms. high. The average duty of the whole is, therefore, 49,900,000 lbs. lifted 1 ft. high by the consumption of 112 lbs. of coal. The following engines have exceeded the average duty:

	Millions
Carn Brea—76 in.	52.2
Dolcoath—55 in.	62.7
Mellinear—Gundry's 80 in.	53.9
West Basset—Grenville's 70 in.	52.4
West Basset—Thomas's 60 in.	55.5
West Tolgau—Richard's 70 in.	54.6
West Wheal Seton—Harvey's 85 in.	61.7
West Wheal Seton—Rule's 70 in.	64.6

Original Correspondence.

THE GREAT GAS EXPLOSION.

SIR.—Some surprise has been expressed with regard to what has been called the erratic character of the recent fearful gas explosion near Tottenham Court-road, but it will probably be proved upon investigation that there is really nothing erratic about it, and that under the conditions which may be assumed to have existed nothing else was to be expected. The main which has exploded was not in use—of course a gas main filled with illuminating gas is absolutely safe—but was connected with the charged main at Howland-street. In its normal condition this new main would be filled with atmospheric air, but gas admitted through the Howland-street gate, whether intentionally or by leakage would, if in certain proportions, convert into a highly explosive mixture. Neither the production of this mixture nor the explosion of it upon ignition would constitute a phenomenon, and the result, although fatally dangerous and damaging by its effects, would be of little or no scientific importance, and would simply suggest that greater caution should in future be used to avoid the cause of such a calamity.

But the point of scientific interest is the intermittent and irregular action of the destructive force. There are two centres of action in Percy-street, the second much stronger than the first; these are both in the straight. The third centre is at the angle of Percy-street and Charlotte-street; the fourth at the point where Bennett-street forms a junction with Charlotte-street; the fifth and sixth at short distances from Howland-street. Centres 4, 5, and 6 are also in the straight. There appears to be no difference of opinion as to the ignition having occurred at or near the open end of the new main at Tottenham Court-road, the centres 1 to 6 having formed separate consecutive explosions, the largest crater being formed by explosions 2, 4, and 5. No. 3 was a fair one, but more limited in the range of damage than No. 4, which removed far more ground and heavier flagstones; and also more limited than No. 2, which was strong enough to project paving stones on to the coping stones of a three-storied house. I do not recollect whether there is another slight shiver between what I call No. 2 and No. 3, but it makes no difference to the argument. I have mentioned five on the straight and one at the angle, so that if one is missed it would only be an additional one on the straight.

Without seeing a drawing of the main showing connections, rise and fall, valve-gates, and other details only a very rough idea can be formed; but the No. 3 and No. 4 explosions would appear to be easily accounted for. It is probable that at both points there would be branches let in for carrying gas through Bennett-street and Rathbone-place respectively. If this be so there would be good lodgments for air in each place, and the gas admitted from the Howland-street valve-gate would pass those lodgments, leaving the air in them just as we know that in a colliery the ventilation will pass a foul working place without purifying it unless a brattice be carried up it. It is not difficult to imagine similar lodgments for air at centres 1, 2, 5, and 6, if it be assumed, which is not unreasonable, that the main had not been carefully cleaned out, and that consequently small heaps of dirt or other obstructions remained in the mains. At all events it would be worth while enquiring what precautions had been taken to ensure the main being thoroughly clean. As to how the gas got into the main is really a question of secondary importance, inasmuch as the fact of the explosions being consecutive, as it is reported they were, proves that there was an absence of uniformity in the explosive mixture. With uniformity one would expect an almost simultaneous explosion, and a pretty uniform rippling of the main, but nothing of the kind is observable; there has been a series of separate forces with quiescent regions separating them.

The condition of things actually observed after the explosion would be fully accounted for upon the assumption of lodgment of air. Having so large an area as 3 ft. main the ignition of a fairly explosive but uniform mixture would in all probability either have ripped the main like a paper tube or would have blown out harmlessly like a squib or safety fuse, for the air pressure on the open end would always be smaller than the pressure represented by the strength of the main, and there is nothing to lead us to expect that air would come like sand, and thus form the necessary tamponing to enable the force to break the main. But with air lodgments the effect would be quite different. Upon the ignition of the combustible but non-explosive (though probably nearly explosive) mixture at Bailey-street the flame would run as in a fuse as far as the first air lodgment, where the small addition of air would result in a powerful explosion, and the next body of combustible but non-explosive gas being ignited the same process would be repeated until near the Howland-street valve gate is reached, when even a small compression of the more nearly pure illuminating gas would arrest further progress. In proportion as the lodgment of air at each centre of action was or was not that necessary to bring the mixture to the maximum explosive condition so would the destruction done be greater or less. Whether this view be correct or not it is at least worth some consideration before the enquiry be closed.—*July 8.*

H.

BIRCHILLS HALL BOILER EXPLOSION.

SIR.—The enquiry into the cause of the boiler explosion at Birchills Hall Ironworks terminated on June 26, when the jury gave their verdict. The facts bearing on the explosion seem to have been carefully investigated. Evidence and reports were given by Mr. E. B. Marten, engineer to the Midland Insurance Company, Mr. McDougall, engineer to the Boiler Insurance and Steam Power Company, with which company the exploded boiler was insured; evidence was also given by Mr. W. F. Traill and Mr. T. J. Richards, appointed by the Board of Trade. The following is the substance of the verdict:—That the 25 persons came by their death on May 15 through the explosion of No. 4 boiler. They find that the hard firing the boiler was subject to day and night, the thinning of several of its plates by corrosion, and the frequency of repairs on these plates, brought the boiler into a state too weak to withstand the working pressure, which they thought exceeded 30 lbs. (the proper pressure), and probably at times rose to 40 or 60 lbs. to a square inch, and about this pressure it exploded. They consider the safety-valve too small for a boiler of 10 ft. diameter. The Birchills Hall Iron Company were much to blame in using the boiler in the manner they have been doing after the repeated cautions of the Boiler Insurance Company. The boilers have not been managed by a competent engineer. From the want of steam and water indicators upon the boiler, the incorrectness of those placed in the engine-house and on one boiler, No. 8, and from the load on the safety-valve being more than the boiler could bear with safety, the jury were of opinion that these defective arrangements show the necessity of Government instituting regulations for the management of steam boilers in general.

The dimensions of the No. 4 Rastrick boiler—concerning which the enquiry was made—have been already given in the *Mining Journal* of June 5. Mr. McDougall in his evidence states that the safety-valve, of $\frac{5}{8}$ in. diameter, was large enough; also, that a while before the explosion (in November, 1879) some of the plates of No. 4 boiler were taken out, and were found to be only 1-16 in. thick; these were substituted by new plates, and some time after the boiler exploded. This goes to show either that the boiler at the moment of explosion must have been subjected to much higher pressure than usual, or if the pressure were the same some other part had given way which must have been weaker than even in the critical state in which it was found in November, 1879. Mr. McDougall gives the pressure that plates 1-16 in. thick will bear (at 18 tons to a square inch), as sufficient for 40 lbs. per square inch in a boiler of 10 ft. diameter. He states that the plates and angle irons about the orifices of the cross tubes were excessively strained, owing to unequal expansion of the shell and cross tubes; this action had led to the necessity for frequent patching at these parts.

Another noteworthy circumstance came out in the evidence, that the position of the float had recently been altered, and the water level lowered, about 2 ft.; the effect of this was to bring the water level below the fire line, and cause overheating at the middle part of the boiler, where the four cross tubes are fixed to the shell. At this part a riveted seam ran around the boiler, and the seam had been

caulked to a great extent, besides the many repairs and patches about the edges of the cross tubes. When the boiler exploded the upper portion flew away at this circular seam from the lower part; there is consequently good ground for supposing that the overheating at this middle part had so weakened the plates that rupture was the consequence. The loss of iron in strength and ductility when subjected to heat, even at comparatively low temperatures, is well understood, and iron of the quality used in the construction and repairs of this boiler, as proved by the tests to which portions of it have been put to, would be peculiarly liable to this action, arising from unequal expansion. The evidence further shows that the plates were not of good quality, and the boiler was bad in construction. Many rivet holes were not fair, and had been heavily drifted; very frequent repairs had been needed; besides which the boiler primed, scale was allowed to accumulate, all showing that it had not been worked under safe conditions. The safety-valve was overloaded at the time of the explosion. There was but one pressure gauge for this group of boilers, and one in the engine-room. A good pressure gauge on this boiler would have shown the overloading, the pressure allowed by the Insurance Company being 30 lbs.

Furnace boilers are peculiarly subject to overheating, and severe wear and tear from straining and wasting of the plates. The theory that the plates at the middle circular seam became overheated and weakened, so much that the boiler ruptured at this part is, perhaps, the correct one. The necessity of more careful supervision of boilers than appears to have been given in this case is much needed, more particularly when the heat from four puddling furnaces is made to act irregularly upon the boiler—an intense heat at one time, and comparatively low at another. The boiler at the first was structurally weak, and of a most dangerous type—fittings essential for the safety of boilers were not applied to it; added to this there was the continual wear and tear from overheating and other causes, all of which would necessitate a careful watching of the boiler daily, and frequent periodical inspections of the interior. It would appear that too much of the responsibility had been placed on the Insurance Company to the neglect of ordinary precautions being taken by the people of the works. At any event, there seems to have been an absence of that careful and skilful supervision which is imperatively needed in the management of ironworks boilers. It is to be hoped that as the Birchills Hall Iron Company have resolved to do away with their other Rastrick boilers that this type of boiler will disappear altogether at all other ironworks, and the safest forms be at once substituted for them. It will be the true interest of owners to adopt this course should the Legislature decide on compensation being made to workmen for injuries received from such accidents as seem to arise from negligent or unskillful supervision. From Mr. McDougall's statement the Insurance Company, it appears, do not profess to relieve the owners from responsibility, or making their supervision less careful and skilful than ordinary, and as there may be some misapprehension on the part of owners on this point, it would be well if conflicting opinions as to responsibility and examination of boilers should be more clearly defined. There was evidently a sad want of daily skilful supervision in this case. However carefully the company's inspector may have made his periodical examinations, perhaps monthly, it is clear that between those periods a great change in the condition of boilers subjected to high temperature may take place, and this could only be found out by the owners' agent or engineer. M. E.

AUTOMATIC FIRE-DAMP DETECTOR.

SIR.—I have just been reading the description of an automatic ventilator invented by Messrs. Jordan, of Gracechurch-street, and which as it has not been patented is open to anyone to use. For the purpose of an automatic ventilator for domestic purposes, and for indicating temperature, I do not think the suggestion is worth much, but if it could be arranged as a detector of fire-damp it might be useful, and as the general system could not now be secured by patent there would be no fear of heavy penalties to pay. The apparatus consists of a perfectly air-tight vessel, formed of very thin sheet metal, and of such shape that no alteration of capacity can occur in ordinary usage. This vessel is encircled by a tube also formed, by preference, of thin metal, which is bent into a circle, but its ends do not quite meet. One end is in air-tight connection with the hollow vessel previously described, and the other is open to the atmosphere. The whole is accurately balanced between centres, so that the circular tube can revolve in a vertical plane. A portion of mercury, more or less according to the size of the ventilator, is poured into the open end of the circular tube, which is uppermost, so that the mercury now collects in the lower portion of the circle on account of its gravity and fluid condition. It is pointed out that the instrument may be made of any size, weight, or power, and may be supplied with means of adjustment, so that it can be regulated to close or open the ventilator at any given temperature, and thus regulate the temperature of any chamber with great accuracy by checking or admitting the heating or cooling currents of air. Messrs. Jordan further state that as a safeguard against fire, gas explosions, or the rupture of vessels containing inflammable materials, the apparatus may be so fitted as to strike off an alarm detonator under any sudden accession of temperature, or by any other mechanical means give audible notice of the accident. Steam from any steam boiler on the premises may be admitted by this detonator or other mechanical appliances to extinguish the fire, or any fire extinguishing fluid may be released from a reservoir. Any such extreme accession of temperature will also serve to completely close the ventilator and stop the draught, and thereby check any combustion in the chamber. An incompressible liquid, such as alcohol, should be used in the closed sensitive vessel to indicate minute variations of temperature, as the action of a gas would be affected by barometrical changes. Judging from the whole of these statements, it appears to me that there would be very little difficulty in adapting the arrangement to the detection of fire-damp as I suggest.

COAL.
Manchester, July 5.

GOLD AND SILVER MINES OF THE UNITED STATES.

SIR.—I promised in my first despatch to forward in my second a view of the past, present, and prospective yield of the gold and silver mines of the United States. This I will now proceed to do.

It is necessary beforehand to say something of the manner in which these statistics are obtained. There are several ways of doing this: 1. By returns from the various mines. Unless great personal exertion is coupled with this method it is bound to be unreliable. The number of mines and placer diggings is exceedingly great. Only the vein mines and the placers worked by hydraulic process are incorporated, and not all of these; the remainder being conducted by individuals, who are generally averse to giving information. In this respect even the corporations are not alacritous; moreover, the latter are not obliged to report to the United States authorities, but only to those of the State in which they are incorporated, and this is sometimes in distant States, and even in foreign countries.—2. By returns from the assayers and the Mints. Another incomplete method, because much of the precious metals is assayed by the miners themselves or their private assayers, and in this state shipped away. The record of deposits at the Mint cannot and do not always discriminate between old and new metal.—3. By deposits at the banks. Most of the metal taken from the mines is sold in the first instance to banking houses; but much of it is not, and this method is, therefore, as imperfect as the others.—4. By the record of shipments through the express or parcel carrying companies. This is the best of all the methods after certain allowances are made. All the metal from the mines, except the comparatively small amount of gold taken from abandoned places by Chinese miners, is shipped by express either to San Francisco or to some eastern city. Express agencies are established in connection with the railway and stage-coach lines in every town or mining camp in the country, even in the most inconsiderable places. The express receives the bullion in sealed packages, and agrees to deliver it at its destination, charging freight and insurance, and guaranteeing safety. Up to within a few years past a single Express Company (Wells, Fargo, and Co.) enjoyed the monopoly of this business. Now it is divided among several. The returns of these companies when taken collectively afford a correct view of the production; but certain allowances must first be made. Sometimes

a given package of bullion is shipped more than once over the mine, and then shipped from town by private conveyance, so that shipment may appear in the newspapers, and give a false notion of the productive power of the mine or district. Making these some other allowances, the character of which would be tedious to describe here, the Express returns afford a complete view of bullion yield. This has been as follows:—

Production of the Precious Metals in the United States since 1875. Based on the Express returns of Wells, Fargo, and other companies after the elimination of certain errors, careful computations by Alex. Del Mar, Mining Engineer, San Francisco. \$5 equal to £1. sterling:—

Year.	Silver.	Gold.	Together.
1876	\$38,200,000	\$40,000,000	\$78,200,000
1877	38,000,000	42,000,000	80,000,000
1878	36,000,000	36,000,000	72,000,000
1879	35,000,000	30,000,000	65,000,000

Note.—One silver dollar is equal to 37½ grs., and one gold dollar is equal to 23½ grs. fine.

It will be observed that I have given round figures in every instance. The reason for this is that in calculations so vast and of precision is unattainable it is misleading to give exact figures or fractions. These figures may be relied upon as correct within a hundred thousand dollars, and that is the most that can be said of any figures of a great national production. The production of West Coasts of British America and Mexico, usually included in Express returns from the United States, is excluded from this.

The outlook for 1880, so far as indicated by the production of first five months, will not exceed that of 1879, and will consist less silver and more gold. My estimate is \$30,000,000 in silver and \$35,000,000 in gold. Among the most promising districts for production is Brodick for gold, and Candelaria for silver.

San Francisco, June 11. ALEX. DEL MAR, M.E., United States Monetary Commissioner.

MINING IN NEW SOUTH WALES.

SIR.—A slow but steady revival is taking place in our mining industry; and, whilst some of the older fields are being at last systematically worked, newer ones are also being discovered and opened up.

In gold deeper sinking at Adelong is proving that good gold sites do no run out with depth, but rather the contrary. At Hill Hill—once famous for its enormous yields at the 250 ft. levels—is the Peace Company has at last managed not only to secure more of the adjoining leases on the golden belt, but also all the ground to the east outside the other claims now at work, into which all the veins underlie; so that the best of whatever is worth working is in the company's hands, and should the rich levels be again raised up in the deeper levels the seven years' patience, pluck, and perseverance of Mr. A. Fairfax and his partners in the venture will be a rich and merited return—as this is, perhaps, the one mining property in the colony which has been worked by business men on business principles, and tens of thousands liberally spent in mere preparatory work. In alluvial the Araluen Valley is also at last the result of Newman's "Underground Drain System," and the floods of last month not only did no permanent damage, but the Crown Company were actually able to work all the time, and as gold over 4 or 5 grs. to the lode is profit, there is a large and payable field before the various adventurers after their five years' digging and persevering efforts.

SILVER.—There is a discovery of some miles of country with silver-bearing lodes at Macleay river, within two or three miles of water-carriage in some places; but, as only one or two shafts are down, and those only 20 or 30 ft., no really reliable result is known. Specimens (picked, of course) assayed from 2000 to 3500 ozs. of silver to the ton, whilst the main lode only showed average of 8 or 9 ozs. of silver and 1 to 2 ozs. of gold—and the Secretary of Mines (Mr. Haines Wood) thought it of sufficient importance to send Mr. Lamont Young, the Government Geologist, to inspect and report (a copy of which report I will send you when published). The Boorook Silver Mines, at Tenterfield, are also giving good results, and proper machinery and skilled knowledge would probably give much greater returns than any got at present by our comparatively rude methods and appliances.

COAL.—The owners of some of the Newcastle collieries have agreed to reduce the price from 14s. to 10s. per ton, and, as the wages were being lowered also *pro rata*, it will leave a handsome profit, especially to such of the companies as are lucky enough to own the Wallsend seam, as whatever ups and downs other qualities have this coal always commands the market, owing to its all-round good character for gas, steam, or household use; and, as the area of it is not very large, and most of the land near Newcastle worked out or soon will be, the holders of the unworked blocks beyond and up to Lake Macquarie will have a good time of it, and have it all their own way in the future.

IRON ORE.—At a few hundred feet beneath Sydney a trial bore has discovered a bed of ironstone of over 250 ft. thickness (in a spot nearer 400 ft.), samples of which assay from 45 up to 50 cent. iron, and said to be of good quality; and, as small coal is delivered at Sydney at 7s. 6d. per ton, the day is probably not far distant when we shall begin to smelt our iron ores, and supply the colonies with pig-iron.

As the railways are now rapidly opening up the colony mining will become a business easily supervised by directors and shareholders in the towns, and there is a growing field here for the investment of capital, the value and importance of which can scarcely be overestimated.—Sydney, May, 1880.

R. D. ADAMS.

SILVER LODES—NEW SOUTH WALES.

SIR.—On the Macleay river, in this colony, a large extent of mineral land has lately been prospected and lodes traced for miles, said to be silver-bearing, more or less. A parcel of samples, assaying from 2000 to 3000 ozs. per ton, I am informed, been sent to England, said to be taken from a 2 ft. lode (running through 40 acres in Crown mineral lease), the inference, of course, being that the lode itself is thus rich, whereas the real fact is that the (carefully picked) specimens are taken from a thin patchy vein in the "dig," whilst the main body of stone will probably not average 10 ozs. of silver through.

My chief object in writing this is to warn the English public generally and the parties in particular to whom these specimens may be sent not to be misled by any statements made by interested parties and on no account to treat for this or any other mineral property in this country unless there is a report on it from the Government Geologist here, stamped by the Mining Department of New South Wales. When, however, there is such a report it may be relied on, as the Government is fully alive to the importance of the matter; and Mr. Wilkinson and Mr. Lamont Young are gentlemen of scientific knowledge and experience, and known to myself personally as honest and conscientious, and utterly unlikely to be influenced by the owners of mines, &c., to render a garbled report.

I go into this matter so fully because the mineral wealth of this colony is so great and so all but utterly undeveloped, and there such a large and safe field for the investment of capital—that leads all higher considerations even out of the question, it is our policy to be honest, for we have not the money to work one-tenth of the known mines; and, therefore, it is the interest of every honest man to try and protect the interest of the home capitalist and investor.

I subjoin a synopsis of Mr. Lamont Young's report (the full original of which I have read), by which you will see that there are not been work enough done to form any real judgment by it; that the indications are promising, and probably sufficiently good to warrant investment for further exploration, especially as we in the colony are utterly ignorant of silver mining, and have only made a first assay at it at Boorook, where the returns as they deeper down are very good indeed:—

Mr. Lamont Young, Geological Surveyor, has forwarded to the Minister of Mines a report upon the antimony and silver ores recently discovered in the neighbourhood of the Macleay river. He says the ores occur in rocks of Devonian age. The antimony ores occur in irregular bunches, occasionally

is a long lake, being in fact the widening of the Ottawa river, situated between 47° and 48° of north latitude, and 79° and 80° longitude west from Greenwich. It is pear shaped, and full of islands. The water is very deep, and the geological formation one that opens a wide field for investigation. I do not know whether the Geological Society of England have turned their attention to Canada as a field, but if they have not they are like people who have never read the works of Charles Dickens, and have a great and interesting study before them. Lake Tunis-camanque is about 90 miles south of Lake Abitibi, which is much larger. The country between those two lakes will certainly reward a geologist who has a delight in the study, whilst the scenery, fishing, and shooting are not to be despised. Where is the old adventure of young Englishmen? Their forefathers were not so wedded to wealth, trade, and luxury that, with very many less advantages, they could not enter on a field of adventure.

The mines on the north shore of Lake Superior, the rocks on that line seem to be of the same formation to the north of Lake Neepin, past Lake Abitibi, down the north side of the Ottawa, across to New Brunswick and Nova Scotia. They almost all abound with minerals.

While, then, the people of the United States are discovering a Leadville, and building up the State of Colorado, let the English and Canadians form an Association, and discover the riches which lie hid in the heart of Central Canada.

BOURNIONITE.

Brockville, June 14.

THE CAPE COPPER COMPANY.

SIR.—I see that it was stated at the meeting of this company, as reported in the *Mining Journal*, that it is contemplated to increase the raisings for 1880 up to 16,000 tons, against 12,165 tons in 1879. This is a very important feature as bearing on future dividends, seeing that an extra output of 4000 tons of 30 per cent. represents 1200 tons of copper at 60*l.* per ton—72,000*l.*, one-third of which, or 24,000*l.*, is net profit, which will go to swell the future dividends. But more than this, it is the best indication of what the directors think of the new discoveries, for they are assuredly not the men to kill or exhaust the goose that lays such golden eggs. That the directors should have decided on this increased rate of production quite disposes of the report so industriously circulated that the "approaching exhaustion" of the mines was the reason why the directors thought it prudent to place such large sums to the sinking fund. Cornwall has produced copper for many centuries, and so will this region, tapped, as it were, but yesterday. To me it seems they were in a dilemma. They had either to do that or declare a dividend of 2*l.*. They chose the first course, not wishing to elate their shareholders too much, and then to have to revert to 1*l.* again.—July 7.

W. B.

CAPE COPPER MINING COMPANY.

SIR.—The suggestion made by "W. W." in last week's *Journal* that this company should proceed in the distribution of profits on a better plan than that which resulted just now in the rather large sum of 27,000*l.* being dealt with in favour of reserve and sinking funds, would appear to be a plausible one, for shareholders would like to see their interest cared for by a more systematic distribution, instead of what looks like starts and fits.

The company, it has been intimated, is entering on a new mode of dealing with its raw products, and the process of smelting the ores and disposing of the refined metal may probably require additional ready means. The balance-sheet of the company explains the desire of the managers to add so largely to the various reserve funds. There is no working capital beyond the portion of profits which each year has been retained and carried to the sinking funds. With the original capital of 140,000*l.*, and a credit of 86,000*l.*, together 226,000*l.*. Assets have been acquired, amounting to 412,000*l.* (including tramway 169,000*l.*), which sum, by the operation of the various sinking funds of together 161,000*l.*, has been reduced to about 251,000*l.*, as against the said 226,000*l.* It should cause, therefore, no surprise if the sinking funds were to receive still further additions, but they should be regular and gradual as the profit admits of it. What is designated as "reserve fund" it must be borne in mind is so on paper only, for it is not specially invested, as the Chairman explained a year or two ago, and forms, therefore, part of the working capital.

The remarks about the ore deposits opened up in sight of 40,000 tons, as described in the report, page 25, representing, as estimated by "W. W.", 720,000*l.*, may be apt to lead to some incorrect inferences. Many of these deposits, as explained by the managers last year, may not be available for a long time to come, forming pillars, supports, &c., required to remain *in situ* for the sake of security of underground constructions.—July 8.

G. P.

THE WORLD'S SUPPLY OF TIN, WITH REFERENCE TO THE UNITED STATES.

SIR.—The readiness with which you allowed my letter of March 20 on the above subject to appear in your crowded columns encourages me to address you once more after an interval of just three months. Since then the whole metal market on both sides of the Atlantic has passed through a serious crisis. The iron market on your side broke down in the face of enormous shipments to the United States, and though our holders and importers showed for a time a bold front they were ultimately compelled to submit to the inevitable—to lower prices, and to accept the situation.

Nearly every kind of metal thereupon became the sport of "bear" sellers, through so-called sympathy with the depression in the iron trade, in utter disregard of its true position. Most conspicuous, however, was the great depreciation in the price of tin, which continued to be hammered down on your side from 100*l.* per ton on Feb. 1 to 68*l.* early in the present month, in the face of falling stocks and reduced supplies from the producing countries. Though our market most reluctantly followed yours in its downward course our dealers were compelled to reduce their prices, in order to protect themselves against indirect importations. On the other hand, our importing merchants stood their ground quietly, warehousing their consignments, and withdrawing from the market, under the conviction that they understood the real position of the article, feeling satisfied that increasing consumption both here and in Europe would sooner or later cause a reaction in the opinions of those who had been led away to believe every floating rumour of what would happen here—that we would swamp you with a re-exportation of 4000 to 5000 tons of our surplus. The actual shipment hence to Holland of 3000 slabs Billiton appeared for a time to remove all doubt upon this subject. The simple fact, however, is this shipment originally was an indirect importation, lying here in bond, liable to 10 per cent. ad valorem duty, the owners replacing the same by the purchase of double the quantity of free tin out of the hands of weak holders. However, it served its purpose as an advertisement, and brought about the revolution in the trade which we have been witnessing during the last 10 days. Orders to buy here Straits, Australian, and Billiton came pouring in from Europe, mainly from London—thus proving to our holders that your operators were at last ready to confess that they had hesitated too long in replenishing your reduced stocks, and dared not go to the East to show their hands there. Their want of success here appears to have forced them to send their orders to Singapore and Penang, and enter into a lively competition with buyers from this side and from China at a period of the year when it is invariably most difficult to find adequate supplies—hence the sudden improvement within a few days of fully 20 per cent. in all the markets.

We may now expect to see even the most sceptical on your side turn round and confess that the centre of gravity of the tin trade is for the time being to be found here, confirming what one of your most experienced men in the trade wrote six weeks ago—that the tin trade of the world is at present controlled by the United States. Considering that indirectly, in the shape of tin-plates, we annually absorb about 8000 tons of fine tin, and fully 13,000 tons more of block of all kinds, it stands to reason that our operations in this article, the annual supply of which hardly exceeds 37,000 tons, should be of paramount importance. But are we likely to get the supply of 37,400 tons for Europe and America anticipated in my letter of March 20?

From information since received, and judging from actual ship-

ments to date, Australia will this year not be able to provide more than 6000 tons, and from the Straits settlements they cannot spare us over 10,500 tons, after satisfying the growing demand for China, which is now rapidly recovering in prosperity in consequence of their fine harvests during the last two seasons.

In my estimate of supplies for the year 1880 I took the combined shipments of Australia, Singapore, and Penang at 19,000 tons; consequently, we find a further deficiency of 2500 tons, or a total (as shown in my original estimate of 61,000 tons) of 8600 tons below the estimated consumption of the world. From this deficit, however, should be deducted the 1000 tons concealed stock returned to London warehouses from the Continent of Europe during last January and February, leaving thus on balance a deficiency of 7600 tons.

Now, as for the consumption on your side, I find that the combined shipments from London and Holland for the first five months were 8763 tons as against 8218 tons at the same period last year, slightly below my estimated increase of 10 per cent. On the other hand, our consumption so far has considerably exceeded my original expectations. Thus our consumers took—

From Jan. 1 to April 1.....	Tons 3700
During all April.....	1200
" May	1100
And I estimate the takings for June at.....	1200

Total for first six months Tons 7200

There is, moreover, every probability that we may do quite as well during the balance of the year; consequently, we shall most likely exceed my original estimate of consumption by over 2000 tons. Our mutual necessities must naturally cause a sharp competition with our English cousins in the markets of the East, of which I am afraid the Chinese miners will not be slow to take advantage; as a first instalment we have witnessed during the last ten days a rapid rise of nearly 25 per cent. in Singapore and Penang, and I should not at all be surprised to see such violent movements frequently repeated before the close of this year.—New York, June 24. CONSTANT READER.

ATLANTIC AND GREAT WESTERN RAILWAY.

SIR.—Now that the line has been relaid the First Mortgage at the present price of 67*l* to 68*l* would seem worth attention. There are good traffics to look forward to, and this will affect not only the gross earnings, but the net earnings. The receipts for the week ending June 27 were \$95,000, against \$80,000 of last year; this is equal to an increase of over 18 per cent. Now that the line is in uniformity with other railroads *bona fide* holders of the First Mortgage Bonds may rest assured that the next earnings will be satisfactory enough, so as to yield them a certain income. For many years past there has not been a better chance for intending purchasers of railroad bonds to increase their capital *bona fide* 50 per cent. within the next twelve months as there is in the certain rise of the First Mortgage Bonds.

London, July 8.

B. E.

DOLCOATH MINE.

SIR.—Great credit is due to Mr. Heard, of the West Briton, Truro, for his persistent endeavours to bring mining committees and pursers within the limits of propriety. He is the holder, I believe, of shares in numerous mines, amongst the rest West Bassett, South Frances, Dolcoath, Tincroft, and Carn Brea. Whenever a meeting is held of the adventurers in any mine in which he holds any interest, and he finds any irregular proceedings, such as cooking the accounts, he rises to express his disapprobation of them, and his efforts in the right direction have in some measure been successful. You will remember how at West Bassett, Tincroft, Carn Brea, and Dolcoath he found out by pressure that heavy balances were due to bankers unknown to the companies, and how in those mines he induced by exposure the committees to set the accounts in a proper light—i.e., to stop "cooking" of them. I am aware that by so doing he gave umbrage to the cooks, but now that matters are straight, in most cases, the offence has ceased.

At Dolcoath meeting, a few days ago, Mr. Heard found that it was intended to declare a dividend of 1*l.* per share, partly from a loan from the bankers, and he expressed his disapproval of the practice of paying dividends out of borrowed money; a very reprehensible thing it is, and why the committee condescend to do so I do not understand. Of course, he could not overrule the decision of the committee, so the dividend was determined on. It may be that some of the shareholders wanted money, and therefore borrowed through the Dolcoath committee. I suppose that I knew mining before any shareholder in Dolcoath, and in my early years such a course was never adopted, and it is quite a novelty in mining. If there was tin in stock, and money was wanted, the stock should be reduced to raise it. Upon the long run nothing is gained by stocking tin, and, if I mistake not, the Dolcoath Company lost two or three years ago by withholding their tin from the market.

I have no personal interest in the matter, but as an outside observer I hereby express my disapproval of the payment of dividends out of borrowed money. It is almost as bad as paying dividends out of subscribed capital. I question whether Captain Thomas approves of dividing borrowed money. The company should divide their own money only, and not that of their bankers.

OBSERVER.

July 6.

WHEAL CREBOR.

SIR.—Noticing several letters on, and reference by, brokers and others to the above mine in a recent issue of your valuable *Journal*, and knowing your desire to give your readers all the reliable information obtainable on these matters, so that they shall not be misled, I venture to send you a few lines for insertion in your next issue. And first, let me say that, not owning a share in the concern, I cannot be said to have any personal motive to serve. My sole desire is to correct some erroneous statements which have recently appeared in reference to this mine generally, and the "new lode" in particular.

At the meeting everything was gilded with roseate hues. A dividend has great power to charm. Nevertheless, 2*s.* 6*d.* per share four-monthly would only be 10 per cent. per annum on a 4*l.* share; and on the present price (6*l.* per share) would only be 6*l* per cent per annum, scarcely reckoned sufficient for mining investments, especially where there is no guarantee of its lasting even another year. A good deal has been said about the lode in the 120. Now, it is well known, or should be so known, by all who have inspected the mine that the winze sunk from the 108, and from which the stopes in the 120 are started, was sunk at the junction of the new lode, or south lode, as it is variously called, with the north branch, or that on which the 108 main level was driven, and that this winze was sunk on the best part of the lode yet seen. The 120 east was started from this winze in a lode reported at 70*f.* to 80*f.* per fathom. After driving some 5 to 7 fms. it has fallen off to 20*f.* per fathom, as might well have been expected, seeing that the level above this, the 108, has been driven for the last six or eight months in totally unproductive ground. The 120 west, which started with a lode reported at 70*f.* to 80*f.* per fathom, has been driven about a dozen fathoms on the south or footwall part of the lode, which part having become absolutely useless the men were put to strip down the north or hanging-wall part, and are now driving on this part, the end being valued at 15*f.* per fathom, plainly showing that the bunch of ore is rapidly failing both east and west. I can also state that in the winze 5 to 6 fathoms above the 120 the lode is not more than 5 ft. wide. In the 108 the main drivage was on the north or unproductive part of the lode, and the so called new lode is, in reality, the main part of the lode, and anyone who may choose to do so can see for himself where the split commences, which is some 3 to 4 fms. west of the first cross-cut put out to intersect the south part. If this be not so, let me ask why they do not drive west on this lode, or why do they not put out cross-cuts further west if they believe this to be a new lode?

Then the statement about the "poor floor of ground" in the winze recently started in the bottom of the 108, on the "new lode," is also calculated to mislead. This is not the only winze sunk on the lode, one having been started some 20 fms. to the west of the present one—just by the first cross-cut—and after sinking it some 3 to 4 fms. was abandoned, the lode having pinched out, conclusively showing that the ore does not hold down. The 108 "new lode" has been

driven more than half the distance there is to drive on this side to reach where it intersects the part driven on; or, in other words, until they will hole out into the main level.

For the distance driven the lode has varied in value from 15*f.* per fathom. The ground in the back of this level, some 20 fms. in length, is being worked in two stopes, and although there may be spots in this distance of the value reported, I defy anyone to say that the average of this ground is anything near the value it is reported at. The cross-cut recommended to be put out at the 120 is another illusion. The folly of spending so much money on this recently put out at this level was fully shown by the results. Doubtless it answered the purpose sought—to report on occasionally having "cut a branch of spar," or "letting out a little water," so excite in the unwary the hope that the "new lode" might be found. The fact is plain that both branches are together at the 72 and poor. Add to these things that at least a year and a half will elapse before the new shaft will be sinking below the 120, and unless further discoveries of ore are made in the eastern part of the mine—of which there are at present no indications—all the available ore will be taken away before that time; and I am bold to say that these shares are at present price 100 per cent. higher than anything in the mine will warrant their being. I need not mention the great inconvenience and expense of getting to surface the ore broken at the 120, where, in consequence of there being no trip-plat, compound of stuff has to be shovelled first out of the tramcar and into the skips, nor of the antiquated method of dressing the ore being things that a sufficient outlay will remedy.

If in what I have written I am wrong—except, may be, slight distances—I should be most happy to be put right, as my sole object is that the public may know the exact position of this mine, that mining generally may not be stigmatised in consequence of reckless speculation in mines without sufficient information.

Horrabridge, July 7.

THOS. TREMARSH.

WHEAL CREBOR, AND DEVON CONSOLS.

SIR.—It is far from my wish to do, say, or write anything in reference to Wheal Crebor tending to disparage it in any manner, or still less to depreciate it in the style so well known amongst the "bearing" fraternity; but in noticing the position it has attained and the advance which has taken place in the price of the shares, has occurred to me, as a shareholder in Devon Consols, that Wheal Crebor shares have advanced beyond the price the consols warrants, or Devon Consols are being most unmercifully "beared" or very much underestimated—a conclusion which anyone comparing the two concerns (as to their production, prospects, dividends declared and being declared) will, I am sure, concur in. If we take the dividends as a basis upon which to calculate their respective merits, find that while Wheal Crebor has distributed dividends to the amount of 6*s.* 3*d.* per share as the result of eight months' working, Devon Consols has paid 18*s.* per share from the profits of six months' production; and looking at the improving quality of the ore, and increased production, together with the points just now coming in ore in the latter mine, I think we may safely anticipate an increase in the dividends for the six months to come.

If the present price of Wheal Crebor may be taken as a standard by which to estimate the value of other mines, Devon Consols ought then, assuredly, to be now selling at from 24*l.* to 26*l.* per share. Individually, I believe they are really worth that price at the present moment, considering the present condition and prospects of the company, and I have not a doubt that they will be at that price, over, before this year terminates, as copper is surely, if slowly, advancing in price, and from what I have heard remarked by one or two astute old brokers, "copper will run up higher than it has yet been." As a shareholder in Devon Consols I confidently anticipate reaping a large profit in due course, and I only regret that limited means prevent my increasing my interest while the price is so favourable. My interest in the good old mine is, however, sufficiently great as to induce me to take up my pen when occasion requires to support its claims to the public estimation, if not greatly remembrance. It certainly deserves both.

July 6.

CORNISH MINING—THE GWENNAP DISTRICT.

SIR.—In drawing attention to the unwrought ground around the Carn Marti range of granite, it may not be out of place to remind the investing public that about 20 years ago the mines then working to the east were United Mines, selling at about 100*l.* per share, and the Great Consols, at 60*l.* per share, to the west; Wheal Buller 500*l.* per share, to the south; Tresavean, 550*l.*, and Trevisk, 400*l.* per share. These were copper mines. There are large pieces of untried ground on the same lodes, requiring only a small outlay to open up mines of equal value. East Wheal Buller is now being developed by means of a cross-cut which will cut the Wheal Buller lode at a depth which several of the greatest mines of Gwennap commenced being ore producing, proving more and more productive in depth, and paying larger profits than any of the other districts of Cornwall. The probabilities are in favour of this mine proving a rich mine as will revive the brilliant era of Gwennap copper mining of former days, there being many old mines in the parish which have profited hundreds of thousands of pounds; it is, moreover, accompanied by an elvan course of correspondingly crystalline character to the one in connection with the great body of ore in adjoining mine, Wheal Buller, and of the one in Tresavean Mine. It is further being intersected by a well known important cross-course, to which is not a little to be attributed the immense accumulations of copper ore met with throughout the district. There are thousands of fathoms of unexplored ground within the limits of this sett, the opening of which will lead to the discovery of mineral wealth, and enrich those who invest the small capital required for its development.

St. Day, Scorrier, Cornwall, July 8.

THE CHINA CLAY TRADE.

SIR.—In the absence of metallic mining in the district of Bodmin and the surrounding parishes the china-clay works supply the population with labour, whereby the labourers earn steadily but low wages. The pay is 2*s.* 6*d.* per day. A few years ago it was only 2*s.* 3*d.*, and previously less than that, I think as low as 1*s.* 9*d.* per day. You will remember the strike a few years ago which these labourers made, by which they lost several months' wages and gained nothing, the shopkeepers who supplied them with food during the strike being the greatest losers, for they have not been paid, and are not likely to be. There is one trait in the character of the day labourers which deserves commendation—they are generally well behaved and sober in their deportment and habits. Many of them are also truly religious. They are not likely to commit themselves again to the risk of a strike—it is too costly a luxury. Painful experience has taught them a long-to-be-remembered lesson. "Experience is a dear school, but fools will learn in no other" is an old adage.

The clay works in Roche, St. Austell, St. Stephens, St. Mewan, St. Endor, &c., are very numerous, and so are the proprietors thereof, of whom Messrs. Martin, Brothers, are probably the chief, because their works are numerous. The West of England Company also send to market a very large quantity of clay every month. You may judge of the extent of their output when I inform you that they export Capt. Fortescue, the landowner, about 7000*l.* per annum for the minimum rent payable to him is 500

Mellengoose Clayworks, in St. Endor, also recently taken in and by him, contain first-class clay. A large water-wheel to drain the pit is about to be erected, and a dry storehouse, tanks, &c., are in readiness for operations. Contiguous to Mellengoose is another valuable clay sett in virgin ground, about to be opened, in Burth Row estate. The tests have proved the quality of the clay to be good, and the bed of it to be very extensive—at least 10 or 15 acres. It can be worked for a few months before the requirement of any pumping machinery besides the water-wheel, which is to serve both pits. A dry railway siding and tanks are about to be erected in Fal Valley, which is the name of the works. Lord Falmouth is the owner of the land in Mellengoose and Burth Row. Near Mellengoose Capt. Cock has an iron mine, in Retew estate, which produces one of good quality. Part of it was formerly worked by the late Mr. J. Davies, of St. Agnes, under the name of Wheal Edith. We have heard a great deal about the badness of the times. I hope the present aspect of things that "there is a good time coming."—*Turbo, July 7.*

R. SYMONS.

BLAEN CAELAN LEAD MINES, CARDIGANSHIRE.

SIR,—I looked carefully through last week's Journal expecting to find an account of the general meeting of this company, which I attended last week, and was disappointed not to find it reported. It seems like "hiding their candle under a bushel" for the directors to fail to send for publication the proceedings of a meeting at which every shareholder seemed satisfied and pleased, and every resolution carried unanimously. The only mention of Blaen Caelan that I received in your Journal, other than the usual weekly report, was in the last paragraph of a letter from Mr. Chas. Williams, which, curiously enough, corroborates the statement made by the manager at the above-mentioned meeting, that "a rich course of lead ore" had been found within the limits of the Blaen Caelan sett on the lode which we have recently passed through in the cross-cut we are driving in the eastern portion of that mine in order to intersect the Esgair-hir lode, and the fact that we have cut a parallel lode on our road thither seems also to corroborate Mr. C. Williams's impression (mentioned in an earlier portion of his letter) that there are two Esgair-hir lodes. This point, however, will soon be cleared up by the proposed drivings in the course of these lodes in the Blaen Caelan sett, and as Mr. Williams gives his address I shall, when next I am in that part of the world, avail myself of his kind offer to point out the spot where he, when manager at Esgair-hir—drove their workings into the rich course of ore in the Blaen Caelan sett, the boundaries of which remain the same as they then were, except that under the present proprietor they have recently been considerably extended so as to include a valuable addition in the West Blaen Caelan Mine. I cannot help thinking that this property, with its extremely moderate capital being far less than the actual money expended on the mines and extensive plant, its already proved results, and its splendid prospects, has been overlooked by the investors in mines, or the shares would hold a much higher position in the market, and probably enough this is a good deal to be accounted for by the palpable indifference displayed by the directors as to making its merits more generally known, an indifference which is by no means participated in by—

A SHAREHOLDER.

[A report of the meeting will be found in another column of this day's Journal.]

BWLCH UNITED, CARDIGANSHIRE.

SIR,—The recommendation of a "Recent Shareholder" to his partners to personally visit the above property is sound, since more can be learned in a short time than can be conveyed even with the power of the pen, and a ready perception formed of the works in progress, the objects aimed at, and the means employed to carry them into force. Three months ago I had occasion to visit Cardiganshire; then as now I passed some hours on this mine—having, in fact, just returned—and knowing well the commercial standing of your correspondent, I must add I should have been pleased to have seen his address attached thereto, although not a London one. However, I freely endorse all he states as to future prospects, and at the same time think it would not be out of place to briefly enumerate the more important works done since my last journey. The 40 ft. water-wheel for crushing purposes has been erected with new launders; crusher entirely renovated with new rollers, raff-wheel, &c.; also connections and fittings for driving the patent six compartment breaker, besides other connections to the round buddles, &c.; new line of rods, pulleys, and stands from the large pumping-wheel, about 130 fms., to the 24 in. revolving plunger for working the said wheel, with large cistern to regulate and cause a uniform flow of water; water-course two miles in length made for supplying the dressing-rooms; and from Ritchie's shaft a line of railway has been relaid with timber and rails to pass; also a line of railway to the crushing-rooms. There is also a lot of other work appertaining thereto and not enumerated. In a few days the mine will be thoroughly equipped for all purposes. The main shaft in the brief interval has been sunk fully 7 fms., and it is satisfactory to find the stratum becoming more marked and congenial for the deep ore deposits, with a strong vugy lode, giving out a large feed of water, as also the stopes improving in their yield of silver-lead ore.

TRAVELLER.

London, July 8.

CARDIGANSHIRE MINES.

SIR,—Since my last I thought it best to go up and see the Camdwr Mawr or Great Camdwr Mine before alluding to it; I, therefore, went up yesterday. This mine was first worked within my own recollection about 40 years ago by the same company who were working Esgair-hir, Alt-y-Crib, and Havan Mines. They did not do much work, but they drove a cross-cut through a mass of mudstone over 4 ft. wide, but never sunk under it. Mr. Henry Francis next worked it under a company, but after sinking about 30 fms. and finding a splendid course of copper, they were compelled to abandon it in consequence of the great quantity of water and want of funds to erect new pumping machinery. Since that time nothing has been done in the old mine, which has now been idle nearly a quarter of a century. During that time, however, several trial pits and levels have been made; and the latest, at the top of the mountain, has proved the depth to be upwards of 100 ft. wide. When I saw this place yesterday was strongly reminded of the great open cutting at Parys Mountain and Mona Mines, which it greatly resembles in many particulars. The workings here are only about 8 fms. deep, having been stopped by a great influx of water, which burst up at the bottom and prevented any further sinking. Other surface workings have proved the existence of two lodes running nearly parallel to the lodes in the old mine, and, in my opinion, all these lodes are coming together in the top of the mountain, and that were the red gossan driven under, a large deposit of mineral will be met with. No great capital is necessary to make the mine one of the most remunerative in Cardiganshire, dressing-floors, water leats, &c., being all ready. The geological formation of the east ground is highly congenial to copper, the great lode running in a channel between killas on the north and Plymlimon grits on the south. In the western or old mine, however, the lodes are entirely in killas, and appear to become lead-producing. These lodes pass through Bwlch Stylen, Vaughan, and other mines to Bronfloyd, where they again come together, forming a very wide and productive lode.

To the north-west of this property we come to the Havan and Penllywch Mines, which appear to be very ancient, and from workings entirely above adit over a million pounds sterling worth of lead and copper has been sold. About 35 years ago I drove a cross-cut south, and then sunk a few fathoms on exactly the same red gossan as is to be seen at Great Camdwr, under which the lode became hard, and we had a splendid rib of copper ore over 9 in. solid. All the courses of ore are dipping west with the hill, and were an engine-shaft sunk on the flat, and driven from east and west, a great mine would be laid open, beyond all doubt; but as for the upper part of the mine, it has been entirely worked away by means of adits. The adjoining sett, to the west, has been worked in a limited way on the same lode, but they have not got the whole of the lode to their level; there is, however, a very nice rib of ore to be seen about 3 in. wide.

We next come to the Ty Newydd and Moelgomen Mines, on which there are four known lodes, the principal of which is the same as

that worked at Mynydd Gorddu, in some places in this mine 10 fms. wide, but on which very little trial has as yet been made. There is no doubt that this is the Havan lode, and that the other three lodes fall in and form a junction with it. In going west on these sets lead has been found in various places on these three lodes, varying in value from 15 to 30 cwts. per fathom; in fact, about 80 tons of lead have been sold, for 16d. to 17d. per ton. The mine is only 25 fms. from surface at the deepest point, and there is no doubt that the present rich bunches of lead of which the lodes are composed are the upshots of a very large contracted body of lead that will be found at but little depth below the present workings, all the mineralogical characteristics of the lodes being greatly in favour of such an opinion. The adjoining mines to the west are Cefn Gwyn and Mynydd Gorddu, which I will reserve for my next.

Dale Cottage, Taliesin, July 8. CHARLES WILLIAMS, M.E.

MINING IN NORTH WALES.

SIR,—Relevant to Mr. J. Humphrey's interesting letter in last week's Journal, there is a question of some interest to mining adventurers which deserves the attention of geologists and miners. I allude to the probability of the lead veins of the calcareous limestone of the Principality prolonging into the subjacent slate rocks below and becoming productive therein. I do not think a precedent can be found in North Wales of a productive metalliferous lode in the Upper Silurian rocks, which, no doubt, are those found in the depths of the Minera Mine, described by your correspondent as clay-slate. May be Pennant Mine, near St. Asaph, is an exception. I have no doubt your able North Wales Correspondent can enlighten us on this point. In Montgomeryshire and Cardiganshire the metalliferous lodes are confined to the Llandeilo beds of the Lower Silurian strata, and the characteristics of the Upper Silurian rocks are thus faithfully described by a well-known geologist—"The Upper Silurian rocks of North Wales are, as a rule, very worthless and profitless to the mason, the miner, and, indeed, very much so to the agriculturist, and have only been so far affected by the slate cleavage as to leave them in a disjointed, incoherent state of mudstone."

I hope some experienced geologist or miner will favour us with his opinion on this point, and say whether the rocks of the Upper Silurian strata deserve condemnation in a mining point of view, or whether, as Mr. Humphreys suggests, they are deserving of further trial when met with under similar circumstances as those described by him at Minera.—Montgomeryshire, July 7.

LEAD MINER.

COMB MARTIN SILVER-LEAD DISTRICT.

SIR,—I have just come across a letter in the Journal referring to the prospects of the Comb Martin district. Having recently paid a visit to the neighbourhood I can fully endorse the remarks therein contained, and should not be surprised at any moment to hear of an important discovery being made here. I have carefully inspected both the east and west sides of the valley. It is true that no very large quantities of silver-lead have actually been sent to the market yet; but there are scores of mines which take years of careful working before that reward comes, which ultimately well repays the adventurer for his patience. The prospects of the old Comb Martin Mine are all that could be wished, and it is under able management. Were I asked which piece of ground I should recommend for a future mine I should without the slightest hesitation select the property belonging to Mr. John Boyle, of this parish. There are several well-defined lodes running through the entire estate, and excellent specimens of silver-lead ore have been broken from the backs of the lodes. There will surely be a mine spring up there sooner or later, in my humble opinion it will be a really good one.

Torquay, July 8.

INSPECTOR.

THE LONDON AND PARIS COAL SUPPLY.

VIA BOSTON DEEPS—THE GRAND FUTURE OF THE GREAT NORTHERN RAILWAY COMPANY.

SIR,—The profound interest you invariably evince in all that affects coal mining—for instance, your last issue stating "The best Durham house coal, Hetton, &c., are only selling, ex steamer, at 14s. 6d. per ton, for which the London merchants charge 22s. per ton to consumers; the coalowner selling his produce at a loss, whilst the merchants are clearing a good profit"—urges me to address you in alleviation of the deplorable state of this most important industry. On May 28 last the top price of the coal market was still lower, having been reduced to 14s. per ton—the lowest quotation ever known on the market. Haswell, Hetton and South Hetton, 14s.; Tees, 13s. 9d.; Lambton, 13s. 6d.; Hetton Lyons, 13s.; from which is to be deducted—

For allowance to coal merchants from derrick.....	1s. 0d.
Discount, payment cash after one month from loading of barges, 3 per cent. (say) off 13s.	0 3
Storage, 1s. per 21 tons	0 0 $\frac{1}{2}$
Coal factor's commission	0 4
City dues	1 1
Interest, 40 days at 5 per cent.	0 9
Minimum freight (the decennial average, 5s. 6d.)	4 0
Total	7s. 5 $\frac{1}{2}$ d.

Further, stamps and postages on cargo, 2s. 6d. to 5s.; petty charges, 7s. 6d.; demurage, the 4s. freight subordinate to immediate dispatch; railway, &c., charges, according to distance; fittage at port of shipment; reducing the price at the pit to less than the minimum charge for Silkstone, stated by the Engineering, Engineer, and Iron—first-class technical hebdomadiaries permeating the coal mining districts—to have been selling at 5s. a ton, a natural reaction of the Durham coal trade on the entirety of the so-called inland output with the present baneful system of the Durham and Northumberland coalowners consigning their coals to the London market to be disposed of on the Coal Exchange without reserve for what they may bring, a modus operandi fraught with the most direful results, as instanced in the wide-spread ruin in the North of England. It must be borne in mind that the freight of 4s. a ton is subordinate to immediate dispatch of the steamer; quite different from former times with sailing ships lying so many market days in the various Thames reaches. Mr. Lindsay Wood, a large Durham coalowner, gave evidence before the Select Committee on Coal in answer to Questions 3382 and 3668: "Our Durham coal is consigned for sale on the London Coal Exchange to intermediate coal merchants (by no means to the consuming public, which my undertaking will do, as the only legitimate and remunerative course), who sell it after levying, as officially alleged, an inordinate profit on the consumers." Sir George Elliot stated in evidence, in answer to Question 7655 by the same committee: "The main cause of all our low prices has been the redundancy of labour; it has never been anything else than the redundancy of labour that has kept down the price of coal." There cannot be any doubt but that the Durham coalowners are alone to blame for the immense loss inflicted on themselves and entailed on the inland districts and railways by their persistence in flooding the London market with their coal and selling it without reserve. That is the cause of the low prices; the coalowners, and not the pitmen or miners, being to blame.

To the north-west of this property we come to the Havan and Penllywch Mines, which appear to be very ancient, and from workings entirely above adit over a million pounds sterling worth of lead and copper has been sold. About 35 years ago I drove a cross-cut south, and then sunk a few fathoms on exactly the same red gossan as is to be seen at Great Camdwr, under which the lode became hard, and we had a splendid rib of copper ore over 9 in. solid. All the courses of ore are dipping west with the hill, and were an engine-shaft sunk on the flat, and driven from east and west, a great mine would be laid open, beyond all doubt; but as for the upper part of the mine, it has been entirely worked away by means of adits. The adjoining sett, to the west, has been worked in a limited way on the same lode, but they have not got the whole of the lode to their level; there is, however, a very nice rib of ore to be seen about 3 in. wide.

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that worked at Mynydd Gorddu, in some places in this mine 10 fms. wide, but on which very little trial has as yet been made. There is no doubt that this is the Havan lode, and that the other three lodes fall in and form a junction with it. In going west on these sets lead has been found in various places on these three lodes, varying in value from 15 to 30 cwts. per fathom; in fact, about 80 tons of lead have been sold, for 16d. to 17d. per ton. The mine is only 25 fms. from surface at the deepest point, and there is no doubt that the present rich bunches of lead of which the lodes are composed are the upshots of a very large contracted body of lead that will be found at but little depth below the present workings, all the mineralogical characteristics of the lodes being greatly in favour of such an opinion. The adjoining mines to the west are Cefn Gwyn and Mynydd Gorddu, which I will reserve for my next.

Dale Cottage, Taliesin, July 8. CHARLES WILLIAMS, M.E.

ways, carts and horses—have agreed with me to act as agents, guaranteeing all sales, which places the French trade on the most secure basis.

With closed stoves the consumption in France is exclusively steam or land engine coal, so that the undertaking will purchase not merely the house but also the steam and gas coals, which will be an immense boon to the coalowners, who have been compelled hitherto to stack their steam coal output during the many months the Baltic is closed by ice and the navigation necessarily impeded. The hyper-

minent evidence in the Hull, Barnsley, and West Riding Junction Railway Bill proves the futility of any attempt to compete with hitherto existing transit to Hull and Grimsby in the coal traffic.

I, with becoming modesty, confidently submit a sovereign panacea

in favour of the Nottinghamshire, Derbyshire, and Yorkshire coal districts.

Silkstone house coal, at a very different price from 5s. a ton—say, purchased at 8s. a ton, at the pit mouth, and conveyed by

the Great Northern Railway Company to their spouts in Boston at their quoted rate for a single truck load—can be delivered into consumers' premises in London at even a saving of upwards of 1s. 6d. a ton upon the disastrous speculative consignment price accruing to the Durham coalowner, whose displacement from the metropolitan coal supply is no longer matter of hypothesis.

The proposed undertaking, via Boston Deep, which has been for a lengthened period so exhaustively brought under the notice of the readers of the *Mining Journal* and *Colliery Guardian*, as the two chief coal mining hebdomadiaries, has entered into the last phase preliminary to its speedy realisation. By means of a limited liability company, entitled the Seaborne Coal and Wood Company (Limited), initiated with a capital of 1,000,000*l.*, with power to increase, the primary object being to supply London and Paris, via the Great Northern Railway and Boston Deep, will effect, as shown in the sequel, a saving of several million pounds sterling, based upon a mere partial participation of the official returns of the import into London in 1879—10,058,811 tons, from 500 to 600 collieries, and average prices for present and last annual decennial periods, and the actual sales effected at pit mouth, with attendant transport, &c., expenses, in both cases to metropolitan consumers' premises. If we take a similar return for the last 50 years an augmented saving results, equally so if the parliamentary evidence of a leading London coal merchant be adduced as basis.

The accountants' return under the sliding scale arrangement in the Durham coal trade—the Ellison and Derby awards—show the deplorable state of the coal trade, as far as the owners and miners are concerned, which this undertaking is alone capable of alleviating, an exuberant margin existing to satisfy, upon an equitable apportionment, vendors as well as purchasers. The aristocratic, popular, and technical Press, in addition to the Minutes of Evidence taken before a Select Committee of the House of Commons appointed to enquire into the causes of the dearness, &c., of coal, and an official coalowners' circular of April 13, 1878, in the Times, and the Trade of the Tyne and Wear Report in the *Mining Journal* of July 3, 1880, have so exhaustively expatiated upon the immensely overstrained or excessive profits alleged to be exacted from the consuming public, and the anomalous and disreputable practices of the London coal trade, that it is necessary, in order to studiously avoid prolixity, to refer very cursorily to a few such data—short weight in a transaction well known on the Coal Exchange to the extent of 12 tons in a single barge-load; the Times and Standard of Oct. 11, 1878, publishing a letter headed "Organised Robbery," proving the delivery of 25 per cent. short weight—dual instances, afloat and ashore, of London coal trade rapacity.

Parliamentary evidence shows the advertisement of coals in the Times by numerous parties under a false name, and so delivered, at a less price than the legitimate or real denomination so falsely advertised could be purchased for at the pit mouth, the working, &c., classes mulcted by the coals passing through several intermediate hands, each levying a profit to the extent of 10s. to 12s. a ton in excess of the high price paid by the better classes for the coals bought of intermediate dealers, and a great deal of rubbishy (*sic*) class of coals sold in London at a high price for household purposes, sales having been effected at a non-remote period in London at 50s. a ton, whilst the current selling price in Yorkshire, the district of origin, was only a moiety, or 25s., whence the cost of coal, freight and delivery to consumers' premises in London was 12s. 8d. a ton, resulting in a profit to the intermediate wholesale dealer of 12s. a ton. The representative of the Miners' Association of South Yorkshire gave evidence before the Select Committee to enquire into the dearness of coal thus—"If you want cheap coal for the public the coalowners must go direct to the consumers. Half the nation is living out of the profits of coal, turning it over from hand to hand. The railway system (the transit by rail to London) will have to be broken down if you are to have cheap coal. I have proof of a coal merchant having a profit of 20s. a ton on 1500 tons." At a recent meeting of Northern coalowners at Morley's Hotel the metropolitan and provincial Press states it was alleged "one firm of middlemen is clearing one year with another 50,000*t.* per annum." The average price at the pits is only one quarter of the London selling price. The registrar of the Coal Exchange, the highest official authority on the metropolitan coal trade, stated in evidence before a Parliamentary Committee that "advantage is taken of any opportunity to raise the price of coal to the advantage of the coal dealers." His 1879 annual report states—"Derbyshire and South Yorkshire coals are very little, if at all, inferior in quality to Durham and Northumberland." Mr Scott attributes the immense increase, and especially that of 1879, of 14 million tons over preceding year's import in the consumption of London chiefly to reduced cost, a series of annual price averages showing that of 1879 to be 133 per cent. less than that of 1808. This undertaking, by means of a large reduction in the cost to consumers with a better quality than what enters so extensively into the London supply from the middle men will create an immensely augmented consumption, with a much improved system of delivery and payment, especially in the case of small shareholders taking the benefit of credit. Holders of a single share can always have credit to the extent of the cost of their share, the importance of which arrangement is evident when workmen are suspended for a lengthened period on account of the weather and other causes, as has been recently the case, and when momentary credit is desirable. The company will purchase and transport in sacks Nottinghamshire, Derbyshire, and Yorkshire house, steam, and gas coal, and sell same in London, Paris, and elsewhere, the transit effected by the Great Northern Railway to Boston, where the coal will be conveyed in decked lighters to the steamer, in Boston Deep, where the largest class vessels have discharged and loaded during time immemorial, perfectly sheltered in 30 ft. water at low water, with ingress and egress unfettered by docks, which will have the advantage of only half the distance to be traversed by the steamer as compared with the Tyne, and an infinitely better navigation from Boston Deep. The transit from pit mouth to the Witham will, as predicted, be effected over the Great Northern Railway Company's system at a rate and tonnage giving them incontrovertibly a much larger net revenue than for the entirety of their London coal transport calculated thus. The conveyance of coal by the Great Northern Railway Company to London in 1879 was, per official returns, 1,129,000 tons from Doncaster to King's Cross, 156 miles, at 5s. 10d. per ton for Yorkshire coal from Doncaster to King's Cross, traversing 1,100,775 miles. It must not be dissimulated that a large proportion of this quantity is handed over to the Great Northern by the North Eastern at a special compound through rate for London. An analogous remark is applicable to their apportionment of the through rate south of the Thames to Kent, &c. Their Notts and Derbyshire differential rate for the shortest distance to London is, as is well known, less than from the greater distance point, and weighs so heavily upon the vend of the Yorkshire coal in London which this Boston transit will equalise.

To acquire equal net revenue not one-fourth of the annual Thames and Seine coal requirements is computed, and that at a rate in excess of the Great Northern mean or average rate from eleven collieries to Boston, and identical with the

Northern shareholders that the Boston coal transit, without taking into account the wood return traffic, not only gives an excess of net receipts to the extent of upwards of 50 per cent. over the entirety of their Doncaster King's Cross net receipts for the entire tonnage of coal they carry, official returns for this year's first quarter's conveyance—258,173 tons—showing a falling off of 50,000 tons, simultaneously with 522,978 tons per Midland, in both cases to London, an increase of about 19,000 tons in that of the Midland, the Chairman of the South Yorkshire and North Derbyshire Coalowners' Association stating in evidence before a Parliamentary Committee—

"The differential rate of conveyance between South Yorkshire, Derbyshire, and Notts was and must be, and always will be, a hindrance to the South Yorkshire coal coming into the London market." But it gives them a quadruple tonnage to carry from the Notts, Derbyshire, South Yorkshire, and West Riding districts over a perfectly dead level, almost denuded of traffic, which their general manager gave evidence of being the best line in the kingdom for the conveyance of coal, and which will immensely augment aforementioned excess of net revenue. With the accelerated passenger traffic, the removal of the coal transport from the main to their loop line will make the Great Northern the safest system emerging from London to the North, and as a self-evident corollary inspire the travelling public with a confidence which is utterly impossible to entertain towards other lines conveying coal to the Metropolis, corroborated by the unqualified opinion of parties thoroughly conversant with the tendency of the period to go on increasing the speed of the passenger traffic. A much greater difference arises in my favour if we take for basis the Great Northern London mileage rate, and a still greater if we descend to the Hull, Barnsley, and West Riding Junction Railway proposed rate reaching to the extent of upwards of 130 per cent. less ton-mileage rate ascertained by the promoter to be remunerative even at a great comparative disadvantage as to gradients. A most important feature presents itself to the immense benefit of the Great Northern Railway Company's exchequer, enabling them to grant the most extended facilities for the coal traffic in the absorption of the wood import trade of the Humber ports, the Hartlepools, Tyne, Lynn, and Sutton Bridge, all weighed down with heavy dock dues and port charges against Boston, a future port, with no dues on inward or outward bound vessels. The Hull dues on shipping, irrespective of such on cargo, is 1s. per register ton from the Baltic, 8d. at Grimsby, and a comparatively high rate at other ports, with immense detention of dock ingress and egress.

The Timber Trades Review of Jan. 17 last states—"The trade in mining timber at Lynn during 1879 has increased 220 per cent. as compared with 1878, which is not surprising when it is borne in mind that the distance from Lynn to the Midland coal fields is about one-half the distance from Hartlepool." The geographical position of Boston gives it an immense advantage over Lynn and Sutton Bridge as regards the entirety of the Midland coal districts. As to the Humber ports and Hartlepool, Boston possesses immense advantages over them as far as regards the Midland district, Birmingham, and the Black Country generally, with immaterial difference of distance to Manchester. Boston Deeps present a great advantage as regards dispatch over the Humber ports, Hartlepool, and the Tyne, with coal at less price than either, and coal freights as a natural consequence plentiful to all parts *via* Boston, from being prepared to issue coal price currents and freight lists in eight languages. The difference of freight from the Baltic in connection with the charges at the Surrey Commercial Docks, and the heavy transit charges from that practically exclusive wood entrepot to the S.W., N.W., and N.E. districts of London, renders the wood supply of London, when effected *via* Boston Deeps, much more advantageous and cheaper to the London purchaser than the hitherto exclusive sole resource to the Surrey Commercial Docks. The larger ships of the company will be employed in transporting the company's wood from the Baltic when the coal import into London is at the lowest ebb in the summer months, and can effect the delivery to consumers in London at a saving of 10s. per standard.

The preponderating element of proposed saving is dispatch, enabling an incomparably greater number of voyages to be made in the year than hitherto, thereby reducing the working expenses to a minimum, not obtainable under the hitherto existing or the latest improved system. Large steamers, with the hull and machinery in the highest state of efficiency, have been conditionally secured (with an exuberance of suitable steamers on the market), of the ordinary type as far as the hull and motive power are concerned, but with five-fold the average cargo capacity of the Coal Exchange official returns, with end-to-end hatchways, and 12 hydraulic cranes each steamer. The Transactions of the British Association, Newcastle, 1863, meeting, as well as the Hull, Barnsley, and West Riding Bill, Parliamentary Committee in 1880, show that in point of dispatch the hydraulic or any other system is limited by the space in the hold of the vessel for the men to work; the vastly increased size of these vessels, with increased number of hatchways and cranes, enabling eight-fold the number of men to be employed, thus securing the grand desideratum—dispatch, far surpassing the maximum attainable at the Derrick, Victoria Dock, Beckton, Nine Elms, and other wharves restricted to the employment of two cranes for steamers, as can be seen in the latest constructed hydraulic system in operation for discharging coal *ex* steamers at the London gasworks, exceptionally three cranes. As to loading the dispatch is also immeasurably greater by the proposed system, in strict harmony with the evidence of the senior Thames Conservancy harbour-master, before the Thames Traffic Committee on March 3, 1878, whose answers to questions 10,364, 5, 7, and 8, confirm the immense advantages of the proposed system. We cannot do better than quote his answer to 10,364—"The vessels loading and discharging in the river could not do their work by frequenting the docks." 10,365—"A ship coming up to day has all her barges ready for her, enabling her to discharge and load and get away to-morrow, which cannot be done if she entered any of the docks." This is exactly our *modus operandi* and plea for attaining infinitely greater dispatch than under hitherto existing or latest improved system. In the Tyne, Wear, the Hartlepool, Humber, and Welsh ports, where an immense capital has been laid out in docks by the railway companies and others, and where the steamers supplying London with coal load, a diametrically opposite course is pursued, entailing very great detention, any trifling isolated exception undeserving of notice. The Inspector-General in the outdoor department of the Customs in the port of London, and the Assistant Surveyor of Customs, on Jan. 27, 1878, gave evidence that "if the system pursued in the shipment of coals at precipice coal ports were adopted in London by shippers it would stop the trade of the port." The largest steamers will load from and discharge day and night into decked lighters in the stream in Boston Deeps and the Orwell, accessible at all states of tide, and in all weathers by day or night, as done in the case of merchandise cargoes at all these places, studiously eschewing the immense delay incidental to docks.

The latest evidence as to the shipment of coal is adduced by the engineer-in-chief and constructor of the Tyne Dock, where 4,112,616 tons of coal were shipped in 1879, averaging 140,000 tons per spout. This quantity can be greatly surpassed by the guaranteed working of each hydraulic crane in combination with the dispatch ensuring sack system, and which is actually done at several places by hydraulic cranes erected by the firm in question on the Thames. Mr. Harrison vaunts of having attained 67 voyages in the year from Tyne Dock to London, which we can triple from Boston Deeps. Shipments of coal by the Great Northern and Boston Deeps to London will effect a saving on Tyne shipment and attendant expense of upwards of 5s. per ton. As to Hull and Grimsby, where the export of coal is shown by the evidence before the Parliamentary Committee on the Hull, Barnsley, and West Riding Junction Bill in January, 1880, to be almost exclusively confined to return cargoes and ballast for ships discharging at Hull, the 1879 export for Hull was 412,368 tons, of which 297,000 tons were by water; and from Grimsby 332,633 tons. A Hull Dock director, the most important on the board, in answer to question 9234, stating that Hull could not in his lifetime become a coal port, which was further confirmed by the unanimous opinion of every one in the coal trade. All coastwise and North Sea, and all fruit, &c., steamers with passengers and cargo requiring dispatch discharge in the Thames, with the exception of special isolated requirements, an exuberance of time is allowed for overhaul, repairs, and contingencies. Immunity from breakage by conveyance in corded sacks o-

the Admiralty type, made much stronger and more durable than those in use by the London coal dealers, which have elicited the highest approval of the Government Inspector of the district. All coals without exception are delivered in sacks in London.

The immense breakage incidental to tender and brittle coal shipped in bulk lessens so greatly the market value that an Admiralty report states the average quantity of coal dust obtained from passing four descriptions of coal through 4-inch screen amounts to more than one-fourth of the whole weight. The loss by breaking entering into the calculations is based upon the evidence of two leading metropolitan coal merchants before a Parliamentary Committee on Household coal. In the depressed state of our shipping it is of paramount importance that an alleviation in the working expenses be sought for in a reduction of the cost of steam coal delivered on board steamers, and an immunity from breakage through trituration in a lengthened rail conveyance, breakage from falling from the shoots in Chelsea basin and at Brentford and King's Cross into the barges, and loading in the docks and river. Upwards of one-fourth small or dust, termed useless refuse (*sic*) by an Admiralty report is shown to exist in Welsh smokeless steam coal, a large proportion being thrown overboard, having been turned to no account in the production of steam. Were the space occupied by this useless refuse (*sic*) filled up with good coal the vessel would be enabled to keep at sea much longer. Leading inspecting engineers of lines of steamers *via* Suez and the Cape state that, according to their lengthened experience, there is actually one-third small and dust in Welsh smokeless steam coal. A printed circular, disseminated by the chief Welsh coalowners, states—"It is a general complaint that the small from the mixed seams of Welsh steam coal will not bind, but falls through the bars to waste, being one of the greatest objections to South Wales smokeless steam coal." According to an Admiralty report Welsh steam coals ought never to undergo the operation of screening on account of their extremely brittle nature, but hand-picked, in perfect harmony with the system now proposed. A prospectus, advertised on July, 1878, in the London papers, states that "Welsh steam coal is depreciated to the extent of 60 per cent. loss of its power in a single year," which is attributable to its decrepitation, or being reduced to dust, termed in the Admiralty report useless refuse. By adapting the Admiralty report to the supply of steamers from the Thames *via* the Suez Canal, the Cape, &c., it will be evident by the appended tabular statements that the undertaking is in a position to realise a sum to steamship owners of more than the entire cost of the coal, with transport, shipping, and all other expenses, delivered under the present system into the bunkers in the docks and in the Thames, by reduced cost of transit and attendant expenses, and perfect immunity from small or dust by breakage. There is, as a rule, no effective check upon the weight put on board steamers otherwise than trusting implicitly to the probity of the coal merchant. At foreign coal stations, and in our dependencies, the coal is all weighed and tallied, being chiefly delivered in sacks, and with the knowledge of the coal robbers under their own eyes no strict surveillance is observed. In the Tyne from time immemorial the keels are weighed and marked, similar to the steamer draught of water or immersion marks, which is not now the case in the Thames. Coal merchants delivering household coal, &c., are by law, Act 1 and 2 Vict., cap. 101, compelled to carry weights and scales with their vans, whereas afloat there is no check to robbery.

By the proposed system each sack can be weighed, or a number of sacks selected to test the accuracy of the weight, each specially made to hold more than 2 cwt. charged. A devis or statement showing a saving effected by this undertaking of more than the total cost of the coal delivered into the bunkers, with attendant expenses of whatever nature, has been drawn up, so that by adding to the London selling price (say) 18s. per ton, one-third breakage 6s., with one-third of 40s. outward freight, 18s. 4d., in perfect consonance with the Admiralty report quoted above, we arrive at a saving in excess of present and for many years existing bunker prices in the London Docks. With this exuberant margin the coal at the pit's mouth can be raised for the benefit of the coalowners and miners. If we further supplement with the expenses incidental to coaling stations, which are extremely heavy when detention is taken into account, injury to machinery through coal dust, extra friction, wear and tear, additional labour in stoking, with the incontrovertible difficulty of keeping up steam, the fluctuation being rendered less frequent by cleaning out the fires so often through the surcharge of small coal, so difficult with even the greatest draughts to render incandescent in the case of smokeless Welsh steam coal, it will be evident how desirable it is to obtain a supply of tender or brittle coal free from breakage and denuded of smaller dust.

To eschew prolixity, the most minute details are held at the disposal of the investing public. The chairmen of the London and North-Western and Great Eastern, the general managers of the Midland and Great Northern, have proved in the most distinct manner the impossibility of railways competing with water carriage in the transport of coal. The promoter and managing director—Mr. Wm. Joseph Thompson—to give proof of his confidence in the undertaking, is dependent on the successful working of the same for his annual remuneration by means of a commission on net profits, all preliminary expenses being covered by 2½ per cent. on aforesaid capital, no payment in either case being made before the distribution of a dividend of 10 per cent. to each shareholder out of the net profit. Should a less number of shares be allotted than is applied for the deposit will be made available towards the payment on allotment, and the balance, if any, returned to the applicant, and in the event of no allotment being made the deposit will be returned in full.

Prospects and forms of application for shares may be obtained at the bankers, brokers, solicitors, and at the offices of the company, at which latter the Articles of Association and above cited agreement are open to inspection, and all necessary information afforded. I humbly flatter myself the aforesaid matter will meet with the carefull perusal of not merely coalowners and consumers, but of every shareholder in the Great Northern Railway, whose great future is Boston; and the present undertaking, of which movement the public meeting held in Boston, presided over by the Mayor, shows me to be the pioneer, my calculations comprising the most distant collieries, and not including mineral discovered within a comparatively few miles from Boston, which of itself is of the greatest importance.

20, Little Tower-street, July 5. W. J. THOMPSON.

[For remainder of Original Correspondence see this day's Journal.]

THE MINING COMPANY OF IRELAND.

The following is the report of the directors of this company to the proprietors for the half-year ended May 31:—The directors have to report as the result of the operations at the several establishments of the company during the past half-year terminated on May 31 last a loss of 3569l. 16s. 5d., from which is to be deducted the amount carried over from last half-year—776l. 17s. 5d., leaving a net loss of 2792l. 19s.

KNOCKNAHON MINES (County Waterford).—The process of disposing of the remaining property of the company at these mines has been proceeded with during the past half-year, and the directors have sold the company's interest in the Corrig Castle mill and land for the sum of 925l., which amount has been placed to the credit of capital account. The Commissioners of Irish Church Temporalities having offered for sale the mining royalty of the townland of Knocknahon, and the directors, considering that this royalty may at some future time be of advantage to the company, have purchased same for the sum of 50l., which has been placed to the debit of capital account. There has been an expenditure at this establishment during the past half-year of 150l. 12s. 4d.

SILVERADAGH COLLIES (County Tipperary).—During the past six months the output of coal and culm was 15,635 tons, and the sales were 11,860 tons. In the corresponding period of last year the output was 13,926 tons, and the sales were 12,862 tons. The profit shown on the half-year is 979l. 2s. 2d., which arises partly from the increase in the quantity raised. In expectation that the new Southern Railway, so long in construction, will shortly be open for public traffic, the directors have opened up a colliery at Lickfinn, which is on the confines of the coal field near which this railway passes, and within 2½ miles of the Laffan's Bridge Station, where siding accommodation can be with ease provided.

DUHALLOW COLLIES (County Cork).—At these collieries during the past half-year there have been no raisings or sales. The expenditure was 34l. 5s. 5d.

LUGANURE MINES, COUNTY WICKLOW.—The raisings of lead ore at these mines within the past six months were 473 tons, as compared with 513 tons in the previous half year. The deliveries of ore to the Ballycorus Smelting Works were 501 tons, of the value of 3908l. 6s. 5d. There was a loss on the workings of the half-year of 1536l. 3s. 8d., which includes a sum of 3384. 2s. 2d., cost of erecting a water-wheel and other new machinery on the North Luganure lode. The exploration and searches at these mines are being continued, and the works generally are in a satisfactory state. The mining royalties of the manors of Glenlough and Shangan, on which these mines are situate, have hitherto been held

by this company on a terminable lease at the yearly rent of 95l. 1s. 12½ years of this lease remained still unexpired when the lessee's interest in the lease, and the reversion of the royalties at the termination of his lease, were offered for sale by the Commissioners of Church Temporalities, and were purchased for the company by your directors for the sum of 1200l., which has been charged to capital account. The deeds of conveyance are in course of preparation.

BALLYCORUS WORKS, COUNTY DUBLIN.—The advance in the price of tin noticed in the last report, has been followed by an unprecedented depression together with a dulness of trade, which has seriously affected the results of operations at these works during the past half-year. There has been a consequent loss of 1896l. 7s. 8d. at this establishment.

REPORT FROM CORNWALL.

July 5.—We seem in general mining to be just now at a period of inactivity—a lull, as it were, between two waves of progress. There is very little doubt that either there will be no retrograde at all in the standards, or that if there is a slight falling back it will speedily be compensated for by a more substantial recovery. A little of moment, however, is to be expected during the present month, which is generally of a dull character. We had hoped for the recent improvements in the prices of tin would have left us worse off at the commencement of the second half of the year, as we were at the first, but after all the difference is not very great, and if current ticketing is anything more than a farce, giving same results as the old system in a more roundabout way, even the difference is more apparent than actual.

Messrs. Bickford, Smith, and Co.'s instantaneous fuse has noticed on several occasions of late in connection with exhibiting mining appliances and the like. Last Saturday it was made subject of experiment at a quarry in Nanceallen Wood. It was intended to bring away a large quantity of stone, and six holes, 12 ft. deep, were bored in the rock, into which were placed charges of compressed blasting powder; the whole exploded with one report if fired by electricity. Mr. Claude Daubuz, Capt. Bryant, Mr. Bryant, Mr. J. H. Collins, and Mr. Clark (surveyor) were present to witness the experiment, and were well pleased with the result. They satisfied that under such conditions an electric battery was no longer required. The fuse was also tested by blows upon a rock, and failed to explode by concussion such as would arise from the holes. The patent fuse travels so fast when ignited that it cannot follow it. The fact that under the majority of mining conditions results can now be attained by the use of the fuse which formally were only possible under electricity is a very great gain in economy of expenditure and simplicity and ease of operation, and the whole arrangement is without doubt a very valuable one.

Mr. Barrow, of Truro, so well known for so many years in mining circles as the manager of the Carvedras Smelting Works, and confidential agent of Messrs. Daubuz and Co., has died at the advanced age of 85; and his loss will be much regretted where his fine face had for so many long years been welcome. He remained harnessed until the very last, for he was seized with the fainting fit which proved the commencement of his last illness in the summer house itself, about ten days before his death. Old age was, however, the real cause of his decease. Mr. Barrow had been a director of the Cornwall Railway for many years, and was a supporter of schools and other institutions of the city. It is a remarkable thing that so many of our prominent mining men and their successors from the young men of the present generation.

Proof of the need of the precautions laid down in the special system drawn up by Dr. Foster has again been supplied, and this time by Wheal Agar. A couple of men engaged with a boring machine, boring some holes which had been blasted before with dynamite and while so engaged an explosion took place which badly injured one of them and killed the other. The reports from the mine had been heard when they were blasted, and consequently they did not think it necessary to examine the holes and see if any dynamite remained in them. The greatest care had been taken in laying the dynamite, but Dr. Foster, who closely questioned the workmen, thought some little blame attached to the deceased companion, in that they had not examined the holes to see if the whole of the dynamite had exploded before they began to lay them. Under the new rules this will have to be done, and it is satisfactory to know that they will be issued in about a month.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

July 8.—At quarterly meetings yesterday and this afternoon an improved tone was apparent in all departments, and it was believed that before long a revival would set in. The better accounted United States metal market were largely the cause of the cheerful appearance of the trade, and indeed new American hoofs and sheets have arrived in the district just recently, and the prices of pig and finished iron were stronger. The official price for all mine pig iron were declared as 37. 10s. for hot blast 47. 10s. for cold blast sorts. Some all-mine firms demanded 2s. 6d. to 5s. more. Hematites were unaltered at 37. 10s. to 37. 2s. and Northampton pigs were 27. 7s. 6d., which is a rise of 5s. Finished iron was declared unchanged upon the basis of 8s. for Common bars were 6s. 5s. to 6s. 15s. per ton, ordinary sheets (small) a little over 7s. as a minimum. Coal was unaltered at officially for furnace sorts and 4s. 6d. for engine slack. Upon the quantities easier by 1s. per ton and slack 6d.

There were several noteworthy objects exhibited in the hall, sides Wilson gas-producer (a description of which is appended) noticed an automatic self-sustaining pulley-block, fitted with a patent automatic brake, manufactured and exhibited by the Imperial Steam Pump and Engineering Company, Grove Lane, Smethwick. Mackie's patent wrought-iron spring drums or pulleys, exhibited by Messrs. Bateman and Co., who are also exhibitors of emery wire, metallic pulleys, and various steam taps, &c.; Timmins' patent equal section buffer and draw springs, manufactured by Messrs. Turton Brothers and Matthews, Sheffield; specimens of Oakham pig-iron, shown by Messrs. Ketley, Glenday and Co.; specimen of the Blaenavon Company's pig, fire-clay goods of Messrs. Hartree's Pearson's manufacture, Dunlop's letter box and file, &c.

On Wednesday Messrs. B. Smith and Son, Wolverhampton, the accountants to the South Staffordshire Mill and Forge Works, have made their report of the result of their investigation of the books of twelve selected bar iron firms under the new wages scale agreement. They certify that the net average selling price of bars during the months of March, April, and May was 7l. 1s. 10d. and twenty-four of a penny per ton. Under the award of Mr. Chamberlain, the head of Birmingham, puddlers' wages now become 8s. 6d. per ton. This is the sum that has been paid for a month or two past, so that there will undergo no alteration. The present rate will, under the arrangement, continue in force until the end of September. And paired with a year ago puddlers' wages are 1s. 6d. per ton higher than then, and millmen's wages 15 per cent. higher.

At the monthly meeting of the South Staffordshire Mines Commissioners in Wolverhampton yesterday it was shown that the Tipton Committee contemplate the purchase of the power of the Stow Head pumping-engine, now under water in the Bilston district, and its erection in the Tipton district to help in staying the inrush of Bilston water into Tipton. It is calculated that as its use will permit of the stoppage of other Tipton pumps there will be a saving to the Commissioners in outlay upon pumping of a year. It was announced that Messrs. Bagnall, of the Grouse Colliery, near Dudley Port, are about to lay off their pumping engines—a step which will work to the detriment of the Oldbury district.

A meeting of operatives employed in the South Staffordshire East Worcestershire Tin-Plate Trade has been held in Wolverhampton to consider the wages question. It was resolved not to make any reduction, but the meeting expressed its willingness to reduce the output as being likely to be more beneficial to both masters and men in the present slack state of trade.

Another death has resulted from the Walsall Boiler Explosion on May 15. Titus Lowe, one of the injured, died in the hospital this

The Mayor of Birmingham (Alderman Richard Chamberlain) read the Town Council on Monday a communication from Messrs. Richard and George Tangye, the well-known engineers, offering, if the Council will make provision for a permanent art gallery, to contribute a sum of £5000/- for the purchase of specimens of art for exhibition. Should an equal sum be subscribed by other persons, Messrs. Tangye offer to give a further sum of £5000/- for the same purpose. In the motion of the Mayor, seconded by Alderman Collings, M.P., resolution was adopted, thanking Messrs. Tangye for their generous offer, and expressing the desire of the Council to comply with the conditions, and the General Purposes Committee were instructed to confer with the Free Libraries Committee, and report on the subject.

QUARTER-DAY'S EXHIBITS.—Amongst the most interesting of the exhibits on "Change" was a model of the Wilson Gas-producer. This producer is of a totally different character to those commonly in use, and is readily and advantageously applicable to all classes of furnaces. The impression resting on many manufacturers' minds is that they have seen of gas-furnaces is that the system is both cumbersome and costly, and its advantages consequently open to question. The Wilson producer seems, however, to supply the desideratum of a cheap and effective arrangement, occupying little room, and in all respects suitable to the scientific principles of manufacturers who may desire to have their furnaces worked on a grate, at a small outlay. So long as the fuel in a solid form is burnt on a grate, as at present, the constantly varying demand for the correct quantity of air can seldom or never be complied with; and even though the furnace should be supplied correctly, as far as ordinary appliances, manipulated with ordinary intelligence, admit, still the difficulty is only partly overcome, because, after the air has entered the furnace, the system of combustion does not effect a proper mixing of the gases and air, and unless there is an intimate mixture, perfect combustion is impossible. These principal sources of loss are minimised and lessened in varying degrees by the many systems of mechanical stoking present before the public; but gas firing has for many years been acknowledged the highest authorities on this subject to be the only method of obtaining perfect combustion in every respect, and it has long been foreseen that this system would eventually, in the interests of economy, cleanliness, and perfect control, supersede all others. In short, the advantages accruing from the adoption of gas-firing are of national importance. We may add that the Wilson gas-producer is applicable, not only to all classes of furnaces and stoves, but also to steam-boilers, and that it entirely prevents smoke. It has been adopted by leading firms in the iron, steel, metal, and glass trades, and the model is exhibited by Mr. Bernard Dawson, Mavvern Link.—*Birmingham Daily Post.*

TRADE OF THE TYNE AND WEAR.

July 6.—The demand for Steam Coal for export continues fair—that is, for first-class steam coal—but all other branches are dull. As the make of iron continues large, and the strike in the iron trade in Cumberland has terminated, the prospect for coke is good; most of the coking coalworks are fairly employed, but this is, of course, the full season of the year for the house and gas coal trades. The first half of the year has now passed, and the progress made by the staple trades of the district has been, on the whole, disappointing; the only branch of trade which has improved much is steam coal, although coke has certainly, on the whole, improved, and gas coal has sustained its position. The house coal trade is in a very depressed condition; the supply of this coal to the Metropolis by sea and by rail is so abundant as to cause prices to descend to a level which leaves no profit, if it does not entail a loss on all the coalmasters in the North, and also those whose works are in the Midlands; and there is also a strange anomaly, that this trade is in the bulk in the hands of middlemen or merchants, who continue to get a good profit out of the trade. This subject has engaged the attention of the coalmasters for some years, but as yet it does not appear that any decided steps have yet been taken likely to remedy this great evil.

The revival of the Coal and Iron Trades in the spring led to the opening out of many old shafts and a few new ones, and also to the delighting of numerous blast furnaces, and thus the supply of coal and iron has not exceeded the demand, and consequently the price of these articles is very low, and little profit can be realised; indeed in too many cases a loss must be realised. The amount of business done, it is evident, is great, as is proved by the shipments from the north-eastern ports, and the increasing traffic on the local railway systems. Over production appears to be the evil at present, and so long as any material rise in price is met by increased production this must continue. The number of furnaces in blast at present are 110, and 55 out, making a total of 165 built. In this month last year only 61 furnaces were at work, little more than half the entire number. The Consett Iron Company, Messrs. Samuelson and Co., and Sir W. Armstrong have each one furnace in course of erection. The monthly returns of the Cleveland ironmasters are favourable. The stock of Cleveland pig-iron has only increased by 2382 tons during the month, there being on May 31 251,361 tons in hand, whilst there is now 263,743 tons, or less than six weeks' make. The exports amounted to 6,186 tons, or 357 tons more than were sent away in May last, and 2,378 tons more than were exported in June, 1879. This shows that though the American demand has fallen off there has been an increased export to Scotland and abroad. The trade is not receding; the make has decreased by 8908 tons, and nearly all that has been made has gone into consumption.

The claim of the Durham County colliery mechanics for shorter hours has been referred to arbitration, Mr. S. B. Coxon, of Usworth, and Mr. Douglas, of Pease's West Collieries, being the arbitrators for the coalmasters, and Mr. Crawford and Mr. Devon for the men. Sir A. Cross has accepted the post of umpire, and the case will be heard on the 12th of the present month at the Westminster Palace Hotel, London.

THE MINERS PERMANENT RELIEF FUND.—The eighteenth annual meeting of this valuable society was held on Saturday at Durham. Mr. John Howie presided, and he first alluded to the much lamented death of Mr. Stobart by lightning on June 26. This gentleman was one of the first and best patrons of the fund. He had aided very much in promoting its formation, and also contributed munificently to its funds. The contributions to the fund for the year ending March, 1880, were £7,390. The number of members in the society is 70,663—a slight increase on the previous year. It is pleasing to notice that there has been a considerable decrease in the number of accidents to members. The number of fatal accidents for the year is 108. The number of persons in the fund are as follows:—Widows, 45; children, 800; permanent disabled men, 232; aged miners, 1110: total, 2596. During the past 18 years the total income has been £4,000/-, and total outlay £46,000/-; the owners of collieries have contributed £3,000/- of this amount. The society is a most commendable one, and it certainly has conferred great benefit on the miners, and on the families of those who have been killed by accidents, and much credit is due to the founders, and we think especially to Mr. Blyth, who not only, we understand, originated the fund but has laboured most assiduously to promote its interests during the past 18 years. It is true that he has also acted as paid agent for the fund, and the agencies it appears costs £24/- per annum—a very small sum indeed for a society with an income of nearly £4,000/-, and yet it appears that a considerable portion of the members wish to work the fund without agents, and propose that the local secretaries do the business. A motion to this effect was negatived by a majority of 58, the number of delegates present being 243; the majority ought to have been much larger. It is extremely probable, if not certain, that if such a suicidal motion (as we submit this is) is ever carried the society would speedily fall to pieces; it would, in fact, then consist of a great number of small societies without cohesion or unity. A motion to increase the salary of the agent would in our opinion have been much more appropriate.

The strike at some of the chemical works on the Tyne still continues, with no prospect of a settlement at present; but unless a rapid improvement takes place in the trade the men cannot resist a reduction long. Although the make is reduced owing to the strike, and no stocks of consequence are held, prices are drooping, the late rise in the value of chemicals has not been maintained. As remarked above, the general trade of the district during the first half of this year has been somewhat disappointing, but the prospect for the next half is generally considered to be assuring, with the exception of the trade expected to be done with Russia. The plate and bar mills at Messrs. Hawks and Co.'s works, Gateshead, were re-started on Monday, but some branches of the iron trade in Gateshead continue slack. Messrs. Clark are fully employed with locomotives, marine engines and boilers, &c. The iron ship building trade and marine engine

trade at the river works on the Tyne, at Mitchells, Jarrow and South Shields, &c., are pretty fully employed, as they have been for some time.

The new docks at Hartlepool were opened on Tuesday, a large Norwegian barque from Pensacola drawing 19 ft. 4 in., was taken into the dock. The Hartlepool now possess a dock area of 176 acres, and also extensive timber ponds. The area of some 350 acres consists of a system of docks and timber ponds, to which access can be had either from the deep water entrance at Hartlepool or that constructed 30 years ago at West Hartlepool, and the largest or deep water dock now used has an acreage of 18 acres, with a depth of 27 ft. of water. The total extent of the stone walling of the system is 6000 ft., exclusive of the tidal basin. Extensive warehouses and cranes are soon to be erected in addition to the present accommodation, and when these additions are completed the Hartlepool will offer a port unsurpassed in excellence and safety of entrance by any on the north-east coast of England.

LEAD MINING IN TEESDALE.—At the Green Hurth Mine the large shaft has been sunk 14 ft. below the bottom of the limestone, on the top of which the 130 fm. level is driven. In cutting out the ground at the bottom for water storage the vein has been cut, and it is found to yield excellent ore. This is a most important discovery; it is now found that the vein is not only through the whole of the limestone but far below the sill. There is every reason to suppose that the vein will prove rich to a greater depth. The shaft, which is now completed, will afford means to work cheaply and efficiently, since, after the air has entered the furnace, the system of combustion does not affect a proper mixing of the gases and air, and unless there is an intimate mixture, perfect combustion is impossible. These principal sources of loss are minimised and lessened in varying degrees by the many systems of mechanical stoking present before the public; but gas firing has for many years been acknowledged the highest authorities on this subject to be the only method of obtaining perfect combustion in every respect, and it has long been foreseen that this system would eventually, in the interests of economy, cleanliness, and perfect control, supersede all others. In short, the advantages accruing from the adoption of gas-firing are of national importance. We may add that the Wilson gas-producer is applicable, not only to all classes of furnaces and stoves, but also to steam-boilers, and that it entirely prevents smoke. It has been adopted by leading firms in the iron, steel, metal, and glass trades, and the model is exhibited by Mr. Bernard Dawson, Mavvern Link.—*Birmingham Daily Post.*

WAGES IN THE IRON TRADE.—The return of the accountants in connection with the sliding scale regulating the wages of the Cleveland miners and the blast-furnacemen, and which is based on the average net selling price of pig-iron, has been issued. The price of No. 3 pig-iron, which governs the wages, was for the last quarter 42s. 4d. per ton, being 4d. per ton less than in the preceding quarter. Wages, therefore, will remain the same, but the men have been since November last in receipt of a substantial addition to their wages.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

July 8.—The Potteries, Shrewsbury, and North Wales Railway, which connects Shrewsbury with the Cambrian Railway at Llanymynech, is now to the great inconvenience of the neighbourhood closed for traffic. This line was one of the grand schemes floated during the railway mania. It was originally intended to connect Stafford and the Potteries with Shrewsbury, and from thence passing Llanymynech and running up the Tanat Valley, past Llangynog, and through the Berwyn Mountains to Bala and the Great Western Railway. Only a portion of some 18 miles was ever made, and this since its construction has drawn out a miserable existence, always in debt, sometimes in charge of a Sheriff's officer, once before closed for traffic, and generally, both in its practical and financial arrangements, in a most unsatisfactory condition. It is announced that a new company have purchased the line, and that extensive alterations are to be undertaken.

An accident occurred lately at the Penmaenmawr Quarry by which two men named Griffith Jones and John Williams were killed. The men were working on the face of the lower gallery, being suspended from the top by ropes. They had just prepared a blast when a mass of rock, said to weigh some hundreds of tons, suddenly fell, carrying the men with it, and crushing them in a terrible manner. Jones was killed at once, but Williams lingered a short while. Both the men were married.

The select committee appointed to enquire into the Liverpool Water Bill has presented their special report to the House of Commons. The report is in favour of the scheme as a whole, but makes exception to some of the details, which, however, do not affect the general principle of the scheme. The workmen of this neighbourhood are anxiously looking forward to the commencement of the works, and many enquiries are being made as to the probable date. One cannot, however, venture to prophecy this, as the bill is not yet law, and even if it were, the works may be delayed indefinitely.

Some time ago I mentioned the destruction of fish caused by the waste water from mines. A letter appeared lately in the Field speaking strongly about the damage caused by the pollution of the Severn and its feeders, near Llandilo, by means of the water flowing from the numerous mines in the district. The Van Mines and the Bryntail Mines were especially mentioned. In the latter mine so much slime is allowed to run off that a sediment is deposited on the rocks in the river as much as four miles below the mine. Now this distinctly points to some mismanagement of the dressing arrangements at the Bryntail Mines. Why is all this valuable slime allowed to be thrown away? It must contain lead in some form or it would not destroy the fish, and no mine can now afford to throw away an ounce of lead. It is reported that the Atlas Ironworks, Manchester, have just taken orders for sixty new locomotives, most of which are for England. There is a proposal now on foot for the construction of a narrow gauge railway, which will be of very great convenience to a number of the Cardiganshire mines, and will add greatly to their value. The railway is to start from Trawscoed, on the Manchester and Milford Railway (the line which connects Aberystwyth with Carmarthen), from there it would run to Llangurig, and from Llangurig to Llandilo. The projected railway from Llandilo to Aberystwyth was constructed as far as Llangurig, and would of course be utilised for the purposes of the new scheme. Now is the time for all those mines which are interested to join together in support of the scheme, and not with mere verbal support, but with something substantial, and leaving some ratio to the benefit which will afterwards accrue to them. There should be no quarrelling about the gauge, or such matters. The chief thing is railway communication, which is the only remedy for the present destructive effects of the costly land carriage.

The Coal Trade in this district keeps very dull, and very little business is done, especially in house coal.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

July 8.—Reports from the leading mining districts are to the effect that matters have been going on much as usual at the mines, whilst no new developments have taken place. A considerable tonnage of ironstone continues to be imported from Northamptonshire, so that comparatively little attention is being paid to the local ironstone, which at one time was most extensively worked. The output of the furnaces has in no way declined, although the demand is considerably below what it has been for Staffordshire, Lancashire, and other localities nearer home. In finished iron there is also greater quietness, the consumption in Sheffield and the neighbourhood of ordinary merchant iron not being so large as it was a few weeks ago, so that the mills are by no means active. The foundries are kept tolerably well going in pipes and other material, but the number of hands employed is not so large as at one time. The Coal Trade is in anything but a flourishing state, and the colliers are on short time, so that many of the miners are not working more than three days a week, and only earning some 10s. or 12s. a week. House coals sell slowly as a rule, still for the month a fair tonnage has been forwarded to the Metropolis, but at prices that cannot be said to leave a profit. Owners, however, do all they can to find employment for their workpeople, and for which they have but scant credit from those who call themselves the miners' friends, as witness the Bill for granting compensation to workmen, which will affect the mining community more than any other, and must lead to a great deal of dissension and bad feeling between masters and men, and divide their interests, which should be identical. The hollowness of the Bill has not been more fully exposed than by Mr. C. Markham, the managing director of the Staveley Company, and Mr. J. Storr Smith, the managing director of the Sheepbridge Coal and Iron Company. They have shown that the insurance funds established and supported by companies have met every requirement, so that no legislation whatever was necessary. What is required is a better trade, so that the workmen could earn better wages, and were the Government to try and effect this the result would be most gratifying, and far more satisfactory than legislation calculated to make masters and men antagonists. It i

gratifying to find that the services of Mr. Howard, the secretary of the Derbyshire Engineers' Association, and who did so much for promoting the erection of the Stephenson Memorial Hall, are about to be recognised, a fund being raised to present him with a suitable testimonial, which he certainly well deserves.

There is nothing new to report with respect to the trade in Sheffield, the heavy branches being still very quiet, whilst consumers of both pig and merchant iron only make purchases for their immediate wants. In South Yorkshire the trade in coal is particularly quiet, and there are rumours of failures abroad, of which more will be heard hereafter. Steam coal is still in brisk request, but prices are still low and unremunerative.

NEW WEIGHING MACHINERY.—A remarkable specimen of workmanship has just been completed by Messrs. Samuel Denison and Son, of Leeds, in one of their large and powerful suspended weighing machines (H. D. Denison's patent) manufactured for the Dutch Government. The machine has almost the delicacy of a chemist's laboratory balance, yet is constructed to bear almost any amount of rough usage. The entire machine measures but 40 in. by 33 in., yet is capable of weighing 50,000 kilos., or 50 tons, and turns with 4 lbs. with the full load on—a result which was in the highest degree satisfactory to the two Dutch engineers who were specially sent over to thoroughly test the adjustment of the machine. The indicating lever is of nickel silver, and the whole machine is artistically ornamented, without in the slightest impairing its strength and utility, and the smaller sizes (for they are made small enough to weigh 10 cwt.) are really elegant little instruments. There are no springs whatever in the machine, judiciously arranged levers moving on steel fulcrum being alone used. Messrs. Denison may well be congratulated upon the perfection to which their weighing machines have been brought.

Meetings of Public Companies.

COLONIAL BANK.

The eighty-fifth half-yearly general meeting of proprietors was held at the Bank House, Bishopsgate-street, on Thursday,

Mr. T. D. HILL in the chair,

Mr. JAMES CLARK (the secretary) read the notice convening the meeting, and the subjoined report of the directors was submitted.—In accordance with the provisions of the Charter, the directors submit to the proprietors the following statement of the debts and assets of the corporation on Dec. 31 as follows:—

DEBTS.	£	452,020	12	6
Deposits, bills payable, and other liabilities	£	2,931,551	12	11
Paid up capital	£	600,000	0	0
Reserved fund	£	97,545	14	9
Balance of profit from last half-year	£	1,412	2	5
Net profit for the half-year	£	36,343	7	5
Total	£	£4,121,003	10	0
ASSETS.	£	304,148	1	1
Specie	£	1,405,088	4	4
Due to the bank in the colonies on bills discounted and purchased (including those past due), &c.	£	24,607	9	9
Due to the bank in London on current accounts	£	2,377,159	14	10
Bank premises and furniture in London and in the colonies	£	10,000	0	0
Total	£	£4,121,003	10	0

It affords the directors pleasure to present the foregoing statement, which they doubt not will be considered satisfactory by the proprietors. The favourable anticipations regarding the price of sugar and of the crops in the West Indies, referred to in last report, have not been fully realised, but the result to planters generally will this year be remunerative, and the directors are happy to state that the accounts from the branches are, on the whole, satisfactory. They propose, therefore, that out of the net profit stated above, which, after providing for all bad and doubtful debts and for income tax, amounts to £38,343 7 5

Added to the amount brought forward of £1,412 2 5

Together £39,755 9 10

An ordinary dividend of 6 per cent. is to be made on the paid-up capital for the half-year ending Dec. 31, which will require £36,000 0 0

And out of the balance of £3,755 9 10

It is proposed to carry forward £2,354 5 3

To reserved fund, increasing that fund to the satisfactory total of £100,000, and leaving £1,401 4 7

To be carried forward to the next half-year.

The CHAIRMAN said that with regard to the report which they had just heard read they would no doubt have observed that the item for bank premises and furniture in London and the Colonies had been raised to £10,000.; this was still very much below the actual value, and they proposed to keep it at that sum. To balance the account £2457, 14s. 9d. was transferred to the reserve, and by adding, as is now proposed in the report, £23547, 5s. 3d. they brought the total amount of the fund up to £100,000., at which they might fairly let it remain for the present at least. He did not doubt that the arrangements which the directors had made would give general satisfaction to the shareholders, and he might take the opportunity of congratulating them upon the manner in which the dividend had been maintained. This encouraging position of their affairs was the more gratifying seeing that the general improvement in the West Indian sugar trade, which they had looked forward to at this time last year, had not been realised. The partial failure of the beet sugar had had a temporary beneficial effect upon the cane sugar industries of the West Indies, but the last accounts from the colonies do not indicate any revival of trade as they had hoped for. They had notwithstanding been able amply, as they believed, to provide for all bad and doubtful debts, and he might say that the bank was never in a better position than at the present time to take advantage of any movement calculated to be of benefit to it. There could be no doubt that, as he had frequently told them, the interest of the bank was to a great extent bound up with the staple produce of the West Indies—cane sugar, and that whatever improved the position of the producers of that article tended to the direct advantage of the bank. The production of the bounty-fed beetroot sugar had lately been increasing at the rate of 100,000 tons a year, and they could readily understand that this production seriously affected the growers of cane sugar, with whom much of their business was carried on; he was, therefore, particularly glad to hear that the Committee of the House of Commons appointed to consider and report upon the question of the bounties on beet sugar by certain continental States were in favour, or at least the majority of them were in favour, of a countervailing duty. He concluded by formally moving the reception and adoption of the report.—Mr. HENRIQUES seconded the motion.

Mr. STOTT enquired what amount of the £23547, 5s. 3d. which appeared on the asset side of the accounts as "due to the bank, cash at bankers," &c., was really in cash.—The CHAIRMAN scarcely understood what was the precise meaning which the proprietor put upon the term "cash." They had rather over a quarter of a million in Consols.

The SECRETARY remarked that technically that would not be "cash"; but he thought that what the honourable proprietor wished to know was how much of the £23547, 5s. 3d. was at once available (Mr. Stott assented), and this would be answered by stating that the greater part of the amount could, if necessary, be made available at a week's notice.

The report was then unanimously agreed to; and, upon the proposition of the CHAIRMAN, seconded by Mr. HENRIQUES, the dividend was also sanctioned.

Mr. BRAVO rose for the purpose of again reminding the proprietors

THE CHAIRMAN, in acknowledging the compliment, remarked that he could safely say that the board fully endorsed the recognition which the proprietors had expressed with regard to the secretary and officers of the bank.

The **SECRETARY**, on behalf of himself and all other officers of the bank, thanked the meeting for the vote, and expressed the hope that they would continue to deserve it.—The meeting then separated.

ENGLISH-AUSTRALIAN GOLD MINING COMPANY.

The ordinary general meeting of shareholders was held at offices of the company, Austinfriars, on Tuesday,

Colonel H. JELF-SHARP in the chair.

The **SECRETARY** read the notice calling the meeting.

The **CHAIRMAN** formally moved the adoption of the report and accounts.

Mr. SCHOFIELD (director), in seconding the resolution, said it must be gratifying to everyone to find that in the course of opening the mine, and particularly in the rise, they had intersected a run of auriferous quartz, the extent of which was unknown, but which he had no doubt, from the language used respecting it by the mining agent, would yield results which would leave the shareholders a considerable profit. The gold was above the standard. The present number of stamps could be increased. If this quartz were as important in quantity as they supposed there could be no question as to the desirability of erecting more stamps. The machinery was powerful enough, and there was little doubt they were now making profits, and would continue to do so. A new manager had been appointed in consequence of the death of the old one. They had had a good character with him, but they could not say much about him at present. He had no doubt he would continue to give them satisfaction. On the whole there was a good outlook before the company, and he felt satisfied they would soon have a largely profitable mine. Mr. Schofield concluded by seconding the Chairman's motion.

Mr. POWELL: You appear to have a very good neighbour.

Mr. SCHOFIELD: They wont tell us what they are doing.

A SHAREHOLDER: What is your financial position?—Mr. SCHOFIELD: We have above £150,000 credit balance.

The SECRETARY: The preference shares only take 8000, so there is an ample margin for profit for the ordinary shareholders.

Major BELL: What will the shaft cost you to complete to the next level?

The SECRETARY: 8000/-, including the pumps, and the lower we go the longer is our run of quartz. We should also get more quickly into it, as the dip is towards the shaft.

Mr. SCHOFIELD: We have two shafts, which very few mines have.

Mr. JEHU HITCHINS: What is your driving power?—Mr. SCHOFIELD: Steam. Our engine (about 30-horse power) is capable of driving more stamps.

Mr. MURCHISON said that Mr. Lewis, a mining inspector of the highest repute in the colony, reported for this company specially upon the mine in August, 1877, and subsequently offered to take it on tribute, spend 3000/- in developing it, and give a good royalty to the shareholders. His report at that time was most favourable.

Mr. SCHOFIELD: And we have now the mine in the position that he wished it to be.

Major BELL: Are the directors receiving any fees?—The SECRETARY: They will get no fees except out of profits.

The CHAIRMAN moved the re-election of Mr. Lamb as a director. This gentleman, whose absence to-day he regretted, has had considerable local experience of the property.—Mr. SCHOFIELD seconded the motion, which was carried unanimously.

The CHAIRMAN moved the confirmation of the election of Mr. Schofield as a director, in the room of Mr. S. W. Daukes, deceased. He was sure they all deplored the loss of Mr. Daukes, with whom he had had the pleasure of co-operating for a period of 10 years.—Mr. POWELL seconded the motion, and expressed his great pleasure that a man of Mr. Schofield's energy and ability had consented to join the board.

Messrs. Brandt, Säufeld, and Co. were then re-elected at a remuneration of five guineas.

In reply to a question, Mr. MURCHISON explained that there was good supervision of the accounts in the colony.

Major BELL suggested that a plan of the mine should be suspended on the walls of the office.

Mr. SCHOFIELD promised that this should be done. By-and-by this would be a great mine, and to make it so he would spare no personal time or energy.

The CHAIRMAN congratulated the shareholders on the different aspect their affairs had now assumed. He could quite endorse what Mr. Schofield had said, and thought that their future would be a bright one.

Mr. JEHU HITCHINS moved a vote of thanks to the Chairman, and said the steady adherence of the directors to this mine would be called by some "obstinacy," but when it succeeded it was called "perseverance." (A laugh.)

Mr. POWELL seconded the motion, which was agreed to, and the proceedings were then brought to a close.

PLACERVILLE GOLD QUARTZ COMPANY.

A general meeting of shareholders was held at the offices of the company, Great Winchester-street Buildings, on Thursday,

Mr. J. IRVING COURTEMAY in the chair.

Mr. H. DELL (the secretary) read the notice calling the meeting.

The **CHAIRMAN** said: The operations of the past year are fully set forth in the report of the general manager, and I now propose to comment on them. Shortly after my arrival at the mine in August last the work of removing the mill buildings to their present site was commenced, but we did not fix upon the precise location without having first had careful surveys made of the surrounding locality, and after giving full consideration to the present condition and probable future requirements of the mine. The result of this examination satisfied us that it would be well to make a small additional purchase of land, the cost of which appears in the balance-sheet, and to build the mill near the creek that runs at the base of the hill on which the mine is situated, and by means of a tramway to convey the ore from the shaft to the mill. The next point was to determine the description of hoisting works to be erected, and it was finally decided to construct them of a size and power that would be sufficient for all purposes for many years. They are capable of hoisting one from a depth of 1250 ft. Seeing that the mine was daily improving in appearance, and that there was every probability this improvement would continue the deeper the vein was worked, I consider it would have been a wrong policy to put up either the hoisting works or other machinery of a capacity that would have necessitated a comparatively early date fresh works. I watched the foundations for the mill being excavated, and the heaviest part of this work was finished when I left in October, and I do not think that any more solid or substantial structure could well be built. I understand that the whole of the other works equal it in quality. Their total cost is £23,311-18; there is included in this the machinery for another 10 stamps, to be erected whenever required. The mill has at present 20 head of stamps, and each stamp crushes 1½ ton of quartz per day; this is fair work considering the hardness of the quartz to be treated. The machinery both of the mill and hoisting works is run by water. I now turn to the mine, and to correctly apprehend the changes and developments that have taken place in it I must remind you of its past history as far as known. In the upper levels the vein is very wide; this portion of the mine was worked in the early days of Californian mining, and in the course of their workings the first owners met with the breakaway the 300 ft. level by which the vein was pinched and disordered; and, as they had neither the capital nor skill to get over the difficulty, they abandoned the mine. After a long interval the present company took it up, and began by sinking simultaneously the shaft and winze to the 400 ft. level. The result was what was anticipated—as we got further from the point of disturbance the vein gradually recovered much of its former size and character, and from about 2 ft. in width it increased to over 11 ft. in the winze above the 500 ft. level; this was the width of the vein when I was at Placerville, since which you will observe by Mr. Price's report it has widened out to 18 ft. in the 500. The total quantity of quartz crushed up to date of his report is 2276 tons, yielding in gold £24,800, or an average of about £11 per ton. The May yield per ton was low, owing to the necessity of working some low grade ore which was encountered in the 5th level. Mr. Price writes on this subject on June 16—

"Since writing you last I have paid two visits to Placerville, and I am pleased to be able to inform you that the stopes were yielding better quartz, as a whole; the vein, however, is still more or less mixed with slate in both the north end of the stopes above the 400 and 500 ft. level drift; in the latter place, however, considerable coarse gold was visible even in the slate; this part of the mine looked very favourable. I am in hopes that this month will come up to the average of our previous crushings." These variations must be expected, as we have to take the mass of the quartz just as we find it; with so wide a vein and the present amount of development there can be no selection, for the mill consumes some 700 tons a month. When we sink another 100 or 200 ft., and have other levels opened, there will be a better opportunity of keeping up a uniform average monthly yield. The reserves of quartz developed, or, as it is called in mining phraseology, of ore in sight, are estimated by Mr. Price at not less than 25,000 tons, and it may reasonably be expected that the bulk of this quartz will yield above the same value of gold per ton as it has hitherto done, and seeing what developments have been made in the last 200 ft. that as greater depth is attained the mine will still further improve. The question of working out is of the greatest importance, and it is satisfactory to note that even at first starting, for we have had only two months regular work—the cost of mining and milling the quartz is not in excess of the estimated figure, the cost per ton for April being 86-32, for May 86-47, and I hope that as the mine is more fully developed the working cost may be further reduced. This left a profit for April of 50/-, and for May of 300/- As soon as the company can afford the outlay it will be most desirable to introduce machinery; ours is just the mine where they will be of the utmost service, the vein being large and the quartz hard, and we can utilise the waste water from the hoisting works to drive them. They will cost complete £5000. Last winter in California was, as you know, of unprecedented severity, the frost in duration and intensity being more severe than hitherto experienced, and the water company was not prepared for the emergency, and could not supply the necessary amount of water, so that the mill did not begin to turn until March. I am informed that they will take steps to guard against this state of things for the future. You will thus see that a portion of the extra outlay was incurred from causes beyond the control of the directors, and I trust the shareholders will approve their policy both in regard to the reduction works and the development of the mine. Should the resolution increasing the capital to £6,000/- be approved, the shareholders will have the option for a period of (say) 10 days of taking up their quota of the new capital at 10/-, but at the expiration of that time the board will allot the shares not applied for as they may see fit, and as the capital even when

increased to the above amount will be moderate in comparison with that of many gold mining companies, while the actual results are of a satisfactory character, and the prospects extremely good, the directors expect to issue such shares upon favourable terms for the company. (Hear, hear.) Gentlemen, I now beg to move the adoption of the report and accounts.

Mr. J. WARD seconded the resolution.

A SHAREHOLDER asked whether they used the Elephant stamp mill they had the right to.

The **CHAIRMAN** said they did not, as it did not all arrive in time.

shipped together but was separated on trans-shipment at Panama, brought over to the mine in detachments. It had been set up and so made, but there had been no time to complete them.

The resolution was then put and carried.

Mr. E. NEAME seconded the resolution, which was put and carried.

The **CHAIRMAN** said that it had been thought desirable to add another member to the board; he had, therefore, great pleasure in proposing the election as a director of Mr. George Wm. Dixon.

Mr. J. WARD seconded the resolution, which was put and carried.

On the motion of Mr. J. D. COBB, seconded by Mr. G. W. DIXON, the retiring auditor, Mr. James Meaton, was re-elected, with a remuneration of 10 guineas.

The meeting was then made special, for the purpose of increasing the capital.

The **CHAIRMAN** said they had the largest portion of the capital represented in the room, and all approved of the proposition for increasing the capital. He moved, "That, on the recommendation of the directors, the capital of the company be, and is hereby increased, by the creation of 5000 ordinary shares of 2/- each, such shares to be first offered to the members in proportion to their existing shares, in accordance with clause 6 of the Articles of Association." He might mention that although they took power to increase the capital by 10,000/-, it was not intended to issue more than 6000/- at present. It would be offered, in the first instance, to the shareholders on the register. He thought that ten days from Saturday next would be sufficient time to give shareholders in which to make their application for their quota of shares. The sooner the capital was issued the better, as they were paying interest on the debt, and the interest was rather high. He trusted that during the next two or three months they would get rid of that debt; if it was paid off there was already an amount of £600/- in hand towards a dividend. The capital of the company being small a small amount of money would pay a good dividend. He hoped this month would also contribute something towards the divisible profits. The shares would be offered in the first instance to the shareholders at par.

Mr. J. WARD seconded the resolution, which was put and carried.

A SHAREHOLDER moved a vote of thanks to the Chairman for the pains and trouble he had taken, and the attention he had given to the business.

A SHAREHOLDER seconded the resolution, which was put and carried.

The **CHAIRMAN**: Of course you include the other directors in it. I can only say that when I was in California I saw the mine developing in a way which could scarcely have been anticipated, and there can be little doubt that the deeper we go the more it will continue to improve. I hope next year we shall meet you under even more favourable circumstances than now.

The meeting then broke up.

GOLD COAST MINING COMPANY.

The first general meeting was held at the company's offices, Grosvenor-street, on Wednesday. There was a large attendance of members. The notice convening the meeting having been read, Captain MOLESWORTH, R.N. (the Chairman), stated that although this was merely a statutory meeting, and the company was too recently formed to allow him the pleasure of reporting any results, he desired to give all information in his power. He stated the great pains he had taken to assure himself of the value of the property before deciding to invest in the company and join the direction; that the company being successfully formed it was determined, after consultation with mining authorities and the consulting engineer of the company, Mr. Dahne, not to send out large quantities of tools and machinery at the outset, but to wait the report of their own mining engineer, which would enable them to work in the most effective and economical way without any preliminary waste. That the mining staff went out on May 15, will have been at Axim about June 7, and that the first report from the mines could not be looked before the middle of August. An ample though moderate quantity of tools and implements had been sent out with the staff, and the experience of the mining companies who had preceded them had enabled them to make great economies in comparison with those companies. The Chairman said further that Mr. Harvey, a great authority on gold mines, reported that the prospects on the Gold Coast were far better than in India; that the board had been informed that should the report of their mining engineer fully bear out previous information, which he believed it would, and that all assays and reports since the formation of the company tended to strengthen his conviction that there was a just expectation of great results.

Many questions were asked by shareholders as to the number of shareholders, which were stated to be over 300, the character of the strata, mode of working, &c., and specimens were exhibited of ore stated to have come out of the shaft 70 ft. deep and 12 ft. by 6 ft. on the company's property, and which assayed several ounces of gold to the ton of ore.

Capt. Peacock's pamphlet, in which was contended that the Gold Coast was the ancient Sofala of the time of Kings David and Solomon, was also mentioned.

Mr. IRVINE (director) stated his most favourable conviction founded on his personal knowledge of and experience in Africa. Their greatest enemy he said was the climate, which was unmistakably bad, but which might be endured by care and proper precautions. He confirmed what the Chairman had said about Mr. Harvey, who told him that one ounce could be got in India five might be got in Africa. This was further confirmed by

Mr. RAWLE, a shareholder, who said Mr. Harvey had similarly expressed himself to him, speaking in the strongest manner of the great wealth of gold in that African district where the Gold Coast Mining Company's property is situated.

We have been informed that shortly after the close of the meeting letters arrived from the Gold Coast with the information that the first shipment of gold by the French Company (the African Gold Coast Company) would be made early in July, reaching England in August; that everything was proceeding most favourably at the mines, past difficulties having been overcome. The arrival of the gold above mentioned, which will be the first known result of gold mining enterprise in West Africa by Europeans will mark the commencement of an era in West African history—the grain of mustard seed to become a great tree. We feel a little national pride that a French company (though partly English by-the-by) should have it, and that all assays and reports since the formation of the company tended to strengthen his conviction that there was a just expectation of great results.

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The shareholders present as a body requested that publicity should be given to what had passed at this meeting, which they regarded as most satisfactory, and that monthly reports from the mine should, if possible, be published and brought to their knowledge, which was promised by the board.

The Hon. F. H. MORSE (director), pointing out that the interest of the shareholders and the board were identical, the members of the board not being independent shareholders, and that they had every reason to believe in success.

Mr. W. LUXEM proposed the usual vote of thanks to the Chairman, which was seconded by Mr. C. RAWLE, and carried unanimously.

COLORADO UNITED MINING COMPANY.

An ordinary general meeting of shareholders was held at New Exchange Buildings, George-yard, Lombard-street, on Wednesday,

Mr. J. COOPE DAVIS in the chair.

Mr. F. ANDREWS (the secretary) read the notice calling the meeting.

The **CHAIRMAN**: Gentlemen, I think you will all agree with me in regretting very much indeed the absence of Sir Cecil Beaufort today, the more so when I tell you the cause of it. I am sorry to say he is very seriously ill from affection of the lungs, and is obliged to keep his room, and we can only hope the summer weather we expect to have shortly will put him right again, and he will resume his duties at the board. (Hear, hear.) With respect to the first resolution which I shall have the honour to submit to you, which is that the report and accounts as sent to the shareholders be received and adopted, I will trouble you with only a few words, and express the regret of the directors that the report is of such a meagre character, and so unsatisfactory to them as well as to the shareholders, and so different from what they were led to expect at the meeting held last year. I dare say many of you will remember on that very day—namely, July 15—when I received a telegram from Mr. Hamill, and it concluded with this remark—"In my opinion we will be entirely out of debt by the end of October." You will remember we all went away rather hopeful, thinking that by the time we met again we might, perhaps, divide something, although it might be but very little; so far from that being the case, by these accounts it is shown that we have only paid off £250/- of that debt, which leaves £400/- owing. There has been another great source of dissatisfaction to the directors and shareholders as well, and that is the very few advices we get from Mr. Hamill. Instead of receiving as we ought to do a weekly or even a monthly letter, during the nine months we only received three letters from Mr. Hamill. True he had an accident, and was laid up, but we telegraphed and wrote to him, requesting him to let his clerk send us news how things were going on. The last letter which we received from Mr. Hamill, with the exception of the one received this morning (which I will adduce to presently), was in March last, and an admirable letter it was, giving us a full and clear account of everything. It was not a sanguine letter, but an admirable letter. Since then we have only received three telegrams, which I will read to you. One was on May 24:—"My accident has heretofore prevented the annual report, accounts and map already forwarded. The reduction of output in March, April, and May was owing to an immense water-course encountered. Stopes had to be suspended, and we could do little else than keep the mine free. Terrible never looked so well as now." We heard nothing further until this day week when we got this telegram:—"We are still unable to produce general meetings postponed until the 25th inst.; important communication to make." We telephoned immediately:—"The directors regret postponement legally impossible." Of course we have been expecting this important communication every day since, and yesterday I was at the office early, asking the secretary if anything had come, but nothing had come. But this morning it has arrived, and we received a telegram and also a letter.

The **SECRETARY** then read the following extract from the letter:—

After incurring expenditure on improving the property, amounting to £35,000, Mr. Hamill goes on to say:—"Many of the necessary but expensive improvements are permanent, and hence will not have to be duplicated, necessarily cutting down our disbursements the coming year for like work. When it is stated that the total number of fathoms stopped in the mine during the past year is but 501 fms., it speaks volumes for the company's property. On March 31, 1879, the accounts on this side present a total indebtedness of £33,914-85. At the present writing, or up to March 31, 1880, the company's indebtedness shows as £13,209-30, or a reduction of over £20,000 during the year. By neglecting

some of the important works of both at the surface and in the mine I object quite easily have paid off the remaining £13,000 and had an excess on hand, the object has been to open up reserves in the mine so that we may not be forced to stop away the ground as soon as it is opened up. I

THE MANCHESTER GEOLOGICAL SOCIETY.

At the meeting of members, on Tuesday (Mr. JOHN AITKEN in the chair), the papers and discussion were almost wholly devoted to geological subjects, and there was a numerous attendance of the leading mining engineers of the district.

Mr. DICKINSON, Chief Inspector of Mines, having exhibited some specimens of stones found in a mine at Radcliffe, a short discussion took place on a paper read at the previous meeting by Mr. W. Topping, "On the Method adopted in Sinking through Quicksand at the 'Furlong Colliery,'" in the course of which Mr. FERRIN observed it was about the finest piece of work of the kind in South-West Lancashire, Mr. Topping having had to contend with a depth of quicksand very seldom met with. A bed of quicksand had been gone through a little further north with set stones, and a good pit made

THE DETECTION OF INFLAMMABLE GASES IN MINES.

Dr. Angus Smith, of Manchester, exhibited and described a "Spark tube," which he has invented for the purpose of indicating inflammable gases in mines. He said the idea of his "spark tube" had been taken from the old compression syringe, which, as they all probably knew, proved that when gases were rapidly compressed the heat given out was sufficient to ignite a tinder, and he had adopted the principle, with the view of indicating the presence of inflammable gases by igniting them by means of compression inside a tube. In his last report as Inspector under the Alkali Acts, he had referred to various modes of detecting fire-damp in mines, and to his own invention, which might be called a new apparatus, not merely because of the mode of making it, but because of the use of platinum, which so greatly exalted the explosive or sparking power of the platinum from becoming wet, and it was probable that other bodies in a fine condition might do equally as well. He should try palladium, for example, and possibly good anti-friction metal without other lubricant would decide the question of dryness. After describing the various experiments which had been made with the view of perfecting the instrument, which consists simply of a small tube, containing two glass windows at the base, and a piston fitting closely into the tube, and which is forced down by a blow with the hand, Dr. Smith said he intended to have a very strong tube, with a glass tube for about 2 in. at bottom, as the internal diameter of this must be at least as great as that of the brass tube. It was necessary to put the glass in from below. To effect this a small cap was made from a screw upon the tube, and this cap contained the glass tube and the windows. The glass must not be closed below, as a blow upon the base readily breaks it, and the air-tightness had, therefore, to be produced by a good stuffing between the glass and the brass, as well as by the screw. The glass was covered with an India-rubber tube, and the two were put into the brass tube, previously having the bottom and sides well covered with glue. A small amount of spongy platinum was inserted, and with the instrument thus constructed 2½ per cent. of marsh gas had been detected. This was not very delicate it was true; but it was an amount which would not explode with a flash or spark unless under exceptional circumstances as the one there mentioned. It would be quite safe to take that explosion in any place, as the flash was confined to the tube, and a man could go in the dark, and as it were feel the state of the air by making a blow upon the piston, but that caused by the heat generated, as the tube was not easy to calculate without some objection creeping in. The use of the tube did not give light sufficient to enable a man to see the way, and it might also come into use in a perfectly safe way: a man could leave his lamp and travel a distance from it, making trials of the air with the tube. It also frequently happened that the roof of a coal mine had gas, and the men tried for the gas with their lamps, which was a most common and dangerous habit. In such cases as these the men could easily leave the lamp on the floor of the mine, and try with the tube alone. Then, again, as they all knew, the inspection of mines was a difficult matter, and it was physically impossible for an inspector to go down the mines very frequently. It might not, however, be impossible to so arrange that pipes connected with all the principal parts of a mine could convey the air to the surface, and that specimens of air might be examined in the office at any time by means of the tube. This, of course, would not prevent any sudden outburst of gas; but it would be a useful guide as to the state of the mine. Experiments were then made with tubes, which were filled with air containing 5 per cent. of ordinary manufactured coal gas, and the piston being rapidly pressed down with the hand, a small explosion could be distinctly seen through the glass windows at the base of the tube.

The CHAIRMAN said they had been very much pleased to hear Dr. Smith's suggestions, and as there were many gentlemen present intimately associated with him he should be glad to hear an expression of opinion upon the matter. If there was no danger of the flame which was excited in the tube communicating with the gases outside, it certainly appeared to be a very fine test. With regard to the question of extracting air from different portions of mine by means of a tube, this seemed to be a very ingenious suggestion, but he was not sufficiently acquainted with mining to say whether it was capable of practical application. A vote of thanks having, on the motion of Mr. DICKINSON, seconded by Mr. BRYHAM (Wigan), a discussion followed on the paper. Dr. SMITH, in answer to a question, said the instrument could never exactly measure the precise quantity of gas in the air, but a man after some experience would be able to tell pretty well by the size of the flame.

Mr. DICKINSON said it was only the other day they had Prof. Forbes before the Society exhibiting an instrument which indicated by sound the presence of gas quite definitely, if not more so, than the instrument now before them. They were both instruments opening out new tests for detecting gas in mines which were likely to be of use, particularly in those mines where gunpowder was used, and the quantity of gas present was such that the safety-lamp would not indicate it, but which might be dangerous with a blowing out shot.

The CHAIRMAN : What is the percentage of gas which would be dangerous?—Mr. DICKINSON said 2½ per cent. was stated to be sufficient if coal dust were present, but experiments were going on in Yorkshire to ascertain if an explosion was not possible where there was no fire-damp present.

Mr. PERRIN did not think such instruments as the one they had just seen, although very ingenious in design and construction, would be of much practical value for mining purposes. Wherever they had coal, they had gas, and if there was not sufficient gas to be detected by a safety-lamp they might consider they were pretty well safe. Nearly every colliery explosion which had occurred in this country, so far as the origin could be traced, had been caused by blown out shots, the flame from one of which had been known to travel 50 yards where there was coal dust, and it was a ridiculous piece of nonsense to talk of miners lighting their pipes and taking the top off their lamps as the cause of the explosions. Many of the experiments which were made for ensuring safety valves were very beautiful in theory, but were worthless in practice. What they had to do was to abolish blasting with powder; it was the only remedy. They must always assume that there was gas in a mine, and the great point to start out to give the miner a splendid lamp, which would show floor, sides, roof, and this would tend to prevent a large number of the fatal accidents of roofs of roof, which frequently occurred because the miner could not see the way. What was wanted was the abolition of blasting, a good light which would be given when there was an abundance of gas, and good ventilation. The invention which had been submitted to them was an extremely clever idea, but as regarded its practical application for coal mining he did not think it was worth the trouble.

Mr. BRYHAM (Wigan) said he had had experience of scores of blown out shots, but he had never had an explosion.—Mr. TOPPING said he used a ton of gunpowder every week, and he never had an explosion. With proper ventilation there was not much fear of explosions.—Mr. BRYHAM said it was quite true that a blown out shot would travel a considerable distance, and he had known a case of a burnt by one at a distance of 50 yards, but that was all the damage done.

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Lectures on Practical Mining in Germany.

AUSTHAL MINING SCHOOL NOTES*—No. CLVII.
BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,
Mining Engineer, Wakefield.
(Formerly Student at the Royal Bergakademie, Clausthal.)

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NATURAL VENTILATION.—Every motion of the atmosphere is caused by a change in the pressure of the atmosphere, and the tendency of the atmosphere to set itself again in equilibrium. The variations of atmospheric pressure are indicated by the barometer, may be looked upon as caused in almost all cases by a change of temperature. The change of temperature operates by causing an expansion or contraction of the air, which alters the density of the air and consequently its pressure.

The two shafts of a mine connected together by a series of levels form, as it were, an inverted siphon, containing air as the fluid. If the two ends of the siphon are in the same horizontal plane—that is, if the two branches are of the same length, and the fluid is of the same density—there will be equilibrium, and consequently no tendency to motion. If, however, the branches are unequal, or there is a difference of density of the fluid in the two branches, there will not be equilibrium, and the heavier of the two columns will descend, forcing the lighter one to rise. If now we imagine the descending column to be rarified as it passes into the exit branch of the siphon, and the other branch constantly supplied with air from a reservoir of the original density of the descending column, we shall have a constant current of air descending the one branch and ascending the other.

The natural ventilation of a mine is caused by the difference in temperature of the air at the surface and underground. The daily and yearly changes in the temperature of the atmosphere and ground are perceptible only down to a depth varying from 70 to 100 ft., according to the nature of the rocks between that depth and the surface. Below this a gradual increase of temperature occurs of about 1° Fahr. for every 60 ft. increase of depth.

Briefly speaking, we may take the mean temperature throughout the year in the mining districts of England at 45° Fahr.; that during the winter months, December, January, and February, at 35°; that during the three spring months, March, April, May, at 46°; that during the three summer months, June, July, and August, at 50°; and during the three autumn months, September, October, and November at 48° Fahr. At a depth of 80 ft. we may assume the temperature of the ground is constant, and for any mine working at a less depth than this that the change of temperature at the surface is more or less felt, and that the summer temperature of the mine is lower and the winter temperature higher than that at the surface. Hence in the case of such a mine, worked by a shaft and an adit level, the air current will descend by the shaft in the summer and enter by the adit in the winter. In the case where the mine is ventilated by two shafts there will be no natural ventilation during the summer, since the air in both shafts will be cooler than that at the surface; whilst in the winter the air in the mine being warmer will tend to ascend in both shafts, so that the direction of the current down one shaft or the other will be dependant on secondary causes.

In the case of a mine 300 yds. deep the temperature of the ground at 80 ft. depth being assumed constant and equal to the mean surface temperature 45° Fahr., and the rise of temperature at 1° Fahr. for every 60 ft. of depth, the temperature of the mine will be (900—80) + 45° = 55° Fahr. This gives a difference between the temperature of the mine and the mean winter temperature at the surface of 23° Fahr., and between the temperature of the mine and the mean spring temperature at the surface of 12° Fahr., and the mean summer temperature at the surface of 10° Fahr. and the mean autumn temperature at the surface of 10° Fahr. From this it will be evident that in the above case the power of the natural ventilation is about twice as great in winter as in spring or autumn, and that in summer the natural ventilation will be nil.

A consideration of the above figures will also show that for a mine 300 ft. deep the air of the mine will have the same temperature throughout the year as the average of the mean spring and autumn surface temperature, and that during three quarters of the year the natural ventilation will be nil, supposing the mine to be worked by two shafts. If in this case the mine is worked by a shaft and an adit the ventilating power will be about equal in summer and winter, but the direction of the current will be down the shaft in summer, and up the shaft in winter; whilst in spring and autumn the ventilating power will be little or nothing.

The ventilation in the case of a mine 300 yards deep, worked by a shaft and adit, is not essentially different from that which is worked by two shafts, except that the air current is stronger.

It is thus evident that the greater the depth of a mine so much the better should be its ventilation; and that mines in districts where the difference between summer and winter temperature is great are more readily ventilated than mines in districts where the difference of summer and winter temperature is not so great.

The main difference in the case of a mine ventilated by a pair of shafts, and of a mine ventilated by one shaft and an adit level, are as follows:—In the case of a mine ventilated by two shafts there is, *a priori*, no reason for the air current to move in one direction rather than the other; and in the case where the air of the mine is warmer than that at the surface, the air will be in a state of unstable equilibrium, or stagnation, until some secondary cause (such as the falling of a man down one shaft) determines the direction of the current. A stagnation of the air current occurs in the case of a mine ventilated by two shafts, whenever the air of the mine is of the same or a lower temperature than that at the surface; whilst in the case of a mine worked with one shaft and an adit stagnation of the air current can only occur when the temperature of the air of the mine is the same as that at the surface; so that a mine with an adit and shaft may be well ventilated on one of the hottest summer days, whilst the air in a mine with two shafts would be perfectly still.

2.—The case where a mine is ventilated by two shafts, but the mouth of one at a much lower level than the mouth of the other can be considered as equivalent to two currents, the one being equal to that which would be produced in the mine with two shafts of the length of the shorter shaft, and the other current produced by a shaft and adit, the depth of the former being equal to the difference in length between the two shafts.

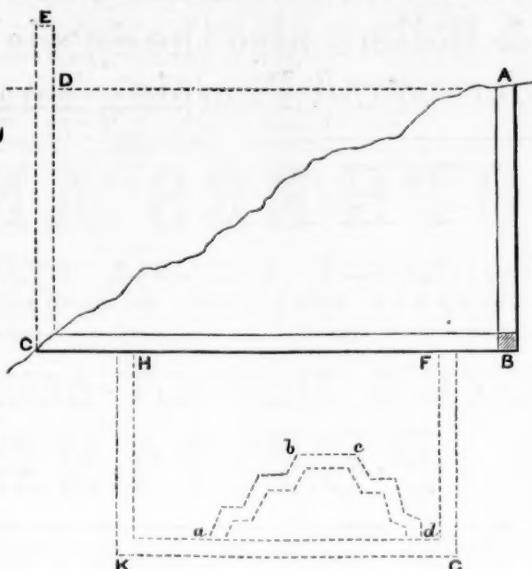
The main arguments deduced from the above figures are but little affected by the fact owing to the burning of lights and the breathing of men and horses, &c., the temperature of the air is in most all cases two or three degrees higher than the temperature of the rock.

In the case of driving adits or tunnels which have only one opening during the time they are being driven the fresh air will enter, pass along next the roof and return along the floor in summer; but the contrary will take place in winter. In the case of sinking an adit there will be a descending current next the sides, and an ascending current in the centre, so long as the rock and air temperature in the shaft is greater than the temperature of the air at the surface. Should the temperature at the surface become greater than that in the shaft stagnation will take place. By dividing the shaft with brattice work two separate air columns are formed, and the strength of the air current is increased. Similarly in the case of an adit or tunnel, the strength of the air current can be increased by fixing an horizontal brattice partition at a convenient height above the floor.

Before proceeding further it will be necessary to consider the effect of a motion of the atmosphere on the production of an air current. We have said that every motion of the atmosphere is due to a change in the pressure of the atmosphere. A change in the pressure of the atmosphere can be produced either by a change of temperature or by a change of density. Natural ventilation is due

entirely to change of temperature. Artificial ventilation may be produced by changing the temperature of furnaces, or by changing the density by mechanical means (ventilating fans, &c.)

In discussing the theory of natural ventilation we shall take the case of a mine worked by an adit and a shaft as the one most general in practice, when no artificial means are used to assist or produce



the ventilation. In the accompanying figure let A B represent the shaft and B C the adit; then no current will move along the adit unless the pressures at the two ends, B and C, are different. Suppose C D represents a vertical column of air of the same section as the shaft over the mouth of the adit, and that it is carried up to the level D A of the mouth of the shaft. It will be evident that the superincumbent pressure of the atmosphere on the top of the shaft air column will be the same as on the top of the air column, C D, in the same level as the mouth of the shaft; and, therefore, that any difference in pressure of the air at B and C must be due to the difference in weight of the air columns, A B and C D. Supposing that the temperature of the mine is greater than that at the surface, the shaft air column will be lighter than the column C D. If the air column, C D, was raised to the same temperature as the air in the shaft A B without any change in the barometric pressure, the air would expand, and fill a larger volume. Supposing, then, that the air column C D was allowed to expand upwards, so as to lengthen the column C D, without any alteration of its sectional area, then the length of this surface column, C E, compared with the depth of the shaft A B, is given by a simple rule that "the height of the motive column is equal to the depth of the shaft multiplied by a factor obtained by dividing (the temperature in mine minus temperature on surface) by (459 plus the temperature on surface)." [The portion quoted replaces formulae which cannot be conveniently printed, and are for other reasons inadmissible in a newspaper; and which, moreover, are chiefly valuable for blackboard illustration.—ED. M. J.]

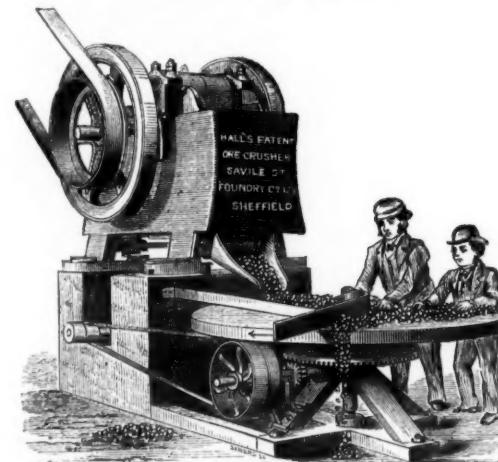
It has been found by experiment that the velocity with which air would flow through an orifice in a vessel, or through an adit or communication between two shafts, would (provided there were no frictional or other resistances) be the same as that acquired by a body falling through the height of the motive column. By the laws of falling bodies the velocity acquired in falling through any given height is equal to eight times the square root of the height. We have, therefore, the velocity of the air along a level (providing there were no frictional or other resistances) equal to eight times the square root of the number expressing the height of the motive column in feet.

From the formula used the following general conclusions may be drawn when frictional and other resistances are not taken into account:—1. The velocity is proportional to the square root of the depth of the shaft.—2. The velocity is proportional to the square root of the difference of the temperature at the surface and underground.

From what we have mentioned in a previous number respecting the difference in composition of the return and the intake air currents, it will be evident that the calculation for the amount of ventilation is not so simple as given by the above rule, but that the amount of moisture and the percentage of other gases, which may be lighter or heavier than pure air, should be ascertained, and the relative density of the return air current thus deduced, and from this the value for the height of the motive column ascertained.

MULTIPLE ACTION ORE CRUSHER, WITH PICKING TABLE—HALL'S PATENT.

MANUFACTURED BY THE SAVILE-STREET FOUNDRY AND ENGINEERING COMPANY, SHEFFIELD.



We illustrate above a convenient arrangement of crusher and picking table for the reduction and separation of ores of different kinds, which will be found extremely useful in mines where several minerals are found associated together, as, for instance, lead and copper, lead and zinc, &c., or in cases where ore is found in considerable pieces combined with the matrix, which becomes detached in solid lumps during the process of crushing, and where it is desirable to separate the same from the poorer stuff without further treatment, as is the case frequently in lead and copper mines.

In dealing with the more precious metals, such as silver, &c., an arrangement of this kind will often commend itself to the mines. Its operations may be two-fold—either to separate the dead stuff from the ore, which requires further reduction, or to take out the solid ore, which requires no further treatment from the rest which is passed to the rolls. This is effected in the following manner:

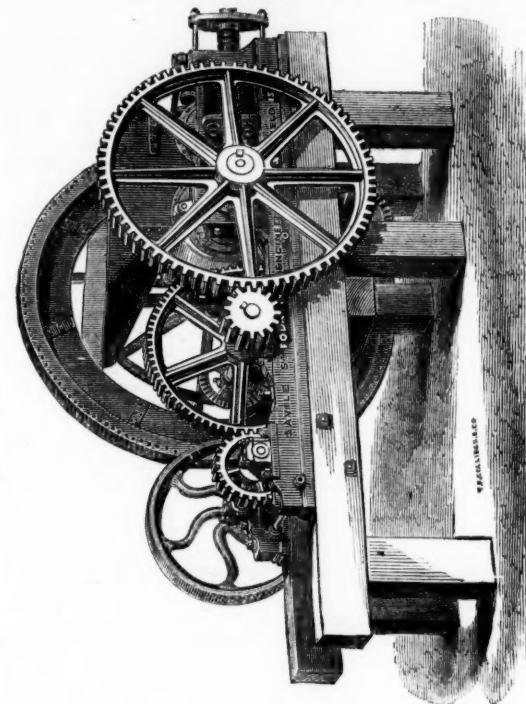
Below the ore crusher at its end is carried upon a frame a slowly rotating table, placed horizontally, around which boys and girls stand sorting the ore. Upon the top of a vertical shaft a curved wiper is

loosely mounted, held by a fixed bracket from some portion of the foundation or frame of the crusher, so that as the table passes slowly underneath the wiper the contents are swept off to one side, leaving the rim clear to receive fresh material from the spout of the crusher.

The machine is usually somewhat elevated, and receives the ore as it comes from the mine, and reduces it to the requisite sizes, which are deposited on the outer edges of the table. Motion is communicated to the latter from the eccentric shaft of the crusher by a belt passing over a pulley on the countershaft fixed under it, as shown; on the opposite end of said shaft another pulley drives a short shaft, which has a fast and loose pulley at one end, and at the other a bevel pinion gear, with a bevel wheel secured to the underside of the table. If a very slow motion is required this can be effected by a worm and worm wheel. The picking table and its accompaniments are self-contained, and can be picked or removed at will. The crusher we have previously described, and need not say more than that it is largely used by some of our most successful mining companies.

This combination is made in all sizes to suit machines from 12 in. × 5 in. to 21 in. × 9 in. at the mouth, and capable of an unlimited amount of work. The tables are larger than usually supplied with such crusher, affording greater facility for work and more room.

IMPROVED CORNISH CRUSHER.



Other improvements which have been introduced by the Savile-street Foundry Company into their crushing machinery deserve the attention of miners. We allude to their self-contained Cornish Crusher, which one would think, from its antiquity, had arrived at finality long ago. This we illustrate at Fig. 2. The primary object intended and secured has been to make each machine independent of extraneous fixing; in other words, they are "self-contained," like the stone-breaker, and this object has been obtained without sacrificing any advantages of the old plan of construction, whilst the cost of fixing is greatly reduced, and one-half the foundation only is required; indeed, beyond levelling on a sound bed there is nothing else wanted. Only those who have had to erect such machinery can appreciate this fact. All the strains and shocks are self-contained, and although it involves necessarily a heavier machine throughout than hitherto used to absorb them, we think the advantages too great to pass unnoticed. Heavy weights and levers to relieve the expanding roll are dispensed with, and an effective slightly elastic medium introduced, which can be regulated according to the hardness of the material under treatment. The machine runs more smoothly, deals with the ore more effectually, and consumes less power by an absence of severe shocks and vibrations so destructive to foundations and gearing.

A wrought-iron raff wheel elevator, with T-iron spokes secured to a central metal box, dispenses with the costly and inefficient old plan of building them up in wood. They are made in various sizes to suit the quantity and hardness of the ore, and can be driven direct from a water-wheel or by gearing from an engine. The shells of the rolls are renewable, and of the high quality of chilled iron for which the company are now noted. Incidentally, we may remark, they have largely superseded the famous American chilled rolls for paper makers and callendering, &c., both here and on the Continent.

MINE TIMBERING.—The paper on this subject, communicated to the Chesterfield and Derbyshire Institute of Mining, Civil, and Mechanical Engineers by Mr. J. CLARK JEFFERSON, A.R.S.M. Wh. Sch., which formed part of the business of the April meeting, has been reprinted in separate form (London: Bemrose and Sons, Paternoster Buildings), and will be found of great practical utility. The author acknowledges as his sources of information his Clausthal lecture notes (with which the readers of the *Mining Journal* are already familiar), Lottner's Bergbaukunde, Sickel's Grubenzimmerung, and Jacinsky's Grubenerhaltung. The volume is admirably illustrated by 38 well executed lithographs, showing the various methods of timbering under different circumstances, so that the Chesterfield and Derbyshire Institute may be congratulated upon having in a single paper secured a valuable treatise upon a subject of paramount importance to the majority of its members.

ROYAL CORNWALL POLYTECHNIC.—The new volume of Transactions—the 47th Annual Report—of this Society (price 2s. 2d. post free) has just been issued. In addition to the report, balance-sheet, and general business details, the volume contains a large amount of information in the form of descriptive notes of the numerous inventions exhibited at the annual competition for prizes, and interesting technical papers, including Natural History Notes, by Mr. Howard Fox, in which are given accounts and figures of the flying squid or calamari, and of centriophorus pomphilus, taken near Falmouth. The form of this latter differs so far from the figures previously given by Couch and Yarrell that they are worthy of careful study.

GAS WORKS AND GAS LIGHTING.—The admirable treatise on the Construction of Gasworks and the Manufacture and Distribution of Coal Gas, by Mr. SAMUEL HUGHES, C.E., which originally formed one of Mr. Weale's Rudimentary Series, for many years enjoyed a high reputation among practical men, but the progress of invention and discovery, and the change of practice, rendered certain descriptions of matters of detail antiquated in some cases, and incomplete in others. The sixth edition (just issued by Messrs. Crosby, Lockwood, and Co., of Stationers' Hall Court) has been completely revised and modernised, re-written, and much enlarged, by Mr. Wm. Richards, C.E., so that it is now as completely a work of the day as was Mr. Hughes's at the time of its original issue. The work is complete from the placing of the coal in the retort to the consumption of the gas in the burner, whilst by way of introduction there is a good historical sketch of gas lighting and chapters on the chemistry of the subject, so that all the information likely to be required will be readily found.



PARIS EXHIBITION, 1878.

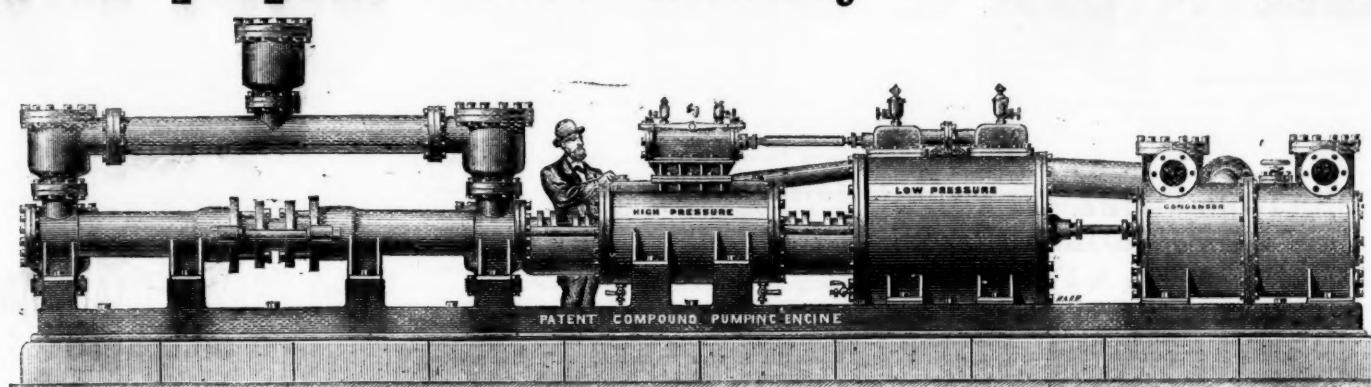
**GOLD AND SILVER MEDALS AWARDED for
Steam-Engines & Boilers, also the Special Steam Pump,
and Compound Pumping Engine.**



TANGYE BROTHERS AND HOLMAN,

CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,
AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, For use in Mines, Water Works, Sewage Works, And all purposes where Economy of Fuel is essential.



TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, WITH AIR-PUMP CONDENSER.

TANGYE'S COMPOUND PUMPING ENGINE COMBINES SIMPLICITY, CERTAINTY OF ACTION, GREAT ECONOMY IN WORKING, COMPACTNESS, AND MODERATE FIRST COST.

This Engine will be found the most simple and economical appliance for Mine Draining, Town Water Supply, and General Purposes of Pumping ever introduced, and as regards Mine Draining, the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pitwork, are required, while they allow a clear shaft for hauling purposes. In this Engine the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere.

The following first-class Testimonials will bear evidence as to the efficiency and economy of the Engine:—

TESTIMONIALS OF TANGYE'S COMPOUND PUMPING ENGINE.

21' Newcastle and Gateshead Water Company, Newcastle-on-Tyne, Oct. 20, 1879.
36 x 10" x 48" COMPOUND CONDENSING STEAM PUMPING ENGINE.
Messrs. Tangye Brothers.

GENTLEMEN.—In reply to your enquiry as to the efficiency of the two pairs of Compound Condensing Engines recently erected by you for this company at our Gateshead Pumping Station, I have great pleasure in informing you that they have far surpassed my expectations, being capable of pumping 50 per cent. more water than the quantity contracted for; and by a series of experiments I find they work as economically as any other engine of the compound type, and will compare favourably with any other class of pumping engine. By the simplicity of their arrangement and superior workmanship they require very little attendance and repairs, and the pumps are quite noiseless. A short time ago I had them tried upon air by suddenly shutting off the column, and found they did not run away, thus showing the perfect controlling or governing power of the Floyd's Improved Steam-moved Reversing Vale. I will thank you to forward the other two pairs you have in hand for our Benwell Pumping Station.

(Signed) Yours respectfully,
JOHN R. FORSTER, Engineer.

The Chesterfield and Boythorpe Colliery Company (Limited).
Registered Office, Boythorpe, near Chesterfield, Oct. 1, 1879.
36 x 12" x 48" DOUBLE RAM COMPOUND CONDENSING STEAM PUMPING ENGINE.
Messrs. Tangye Brothers. Supplied in January, 1878.

GENTLEMEN.—Referring to the above, which we have now had working continuously night and day for the last 12 months, we are glad to say that it is giving us every satisfaction. It is fixed about 400 feet below the surface, the steam being taken down to it at pressure of 45 lbs per square inch. We can work the pump without any difficulty at 28 strokes per minute— $\frac{29}{12}$ piston speed. The pumping power is enormous. The vacuum in the condenser being from 10 to 13 lbs. The pump is easily started, and works well and regularly. The amount of steam taken being much less than we anticipated. We consider the economy in working very satisfactory indeed. The desire for power and economy at the present day will certainly bring the pump into great requisition.

Yours truly,
(Signed) M. STRAW, Manager.

SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder.....	In. 8	8	8	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder	In. 14	14	14	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder	In. 4	5	6	5	6	7	8	6	7	8	10	7	8	10
Length of stroke	In. 24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	360	330	160	360	250	184	140	360	264	202	130	360	275	175
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	203

CONTINUED.

Diameter of High-pressure Cylinder	In. 16	16	16	16	18	18	18	21	21	21	24	24	24	30
Ditto of Low-pressure Cylinder	In. 28	28	28	28	32	32	32	36	36	36	42	42	42	52
Ditto of Water Cylinder	In. 8	10	12	14	8	10	12	14	10	12	14	10	12	12
Length of stroke	In. 36	36	36	36	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,050
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	360	230	160	118	456	292	202	149	397	276	202	518	360	264
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

NORTHERN DEPOT:—TANGYE BROTHERS, ST. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.

JULY 10, 1880.]

SUPPLEMENT TO THE MINING JOURNAL.

799

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SOLE MAKERS—
The LEEDS FORGE CO., Ltd.,
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FOX'S PATENT

CORRUGATED FURNACE FLUES,

NOW APPLIED TO OVER

10



IND.



H.P.

PARIS, 1878.

PRICE LISTS AND
PARTICULARS
ON APPLICATION.

STEVEN'S PATENT UNDERGROUND WINDING ENGINE,

DESIGNED FOR USING COMPRESSED AIR OR STEAM.

SIMPLE, COMPACT, PORTABLE.

Silver Medal, Royal Cornwall Polytechnic Society, 1876.

No. 1 size, 7 in. single cylinder, with 2 ft. drums.
No. 2 size, 9 in. single cylinder, 2 ft. 6 in. drums.
A.—6 in. double cylinder, with 2 ft. 3 in. drums.
B.—8 in. " " 3 ft. 0 in. drums.
C.—10 in. " " 3 ft. 6 in. drums.
D.—12 in. " " 4 ft. 6 in. drums.
E.—14 in. " " 5 ft. 0 in. drums.

MANUFACTURED BY

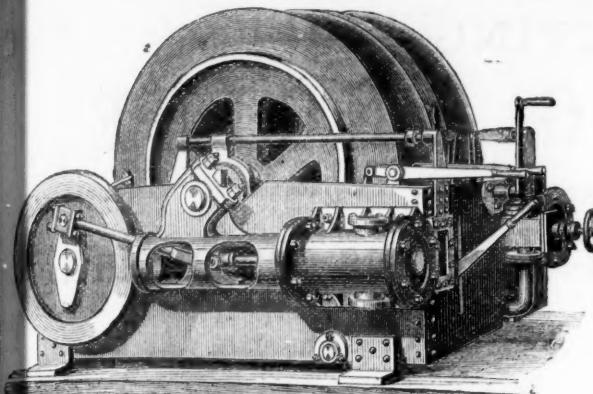
THE USKSIDE CO.,

ENGINEERS, MAKERS OF PUMPING AND WINDING
MACHINERY, AND FORGINGS OF EVERY
DESCRIPTION.

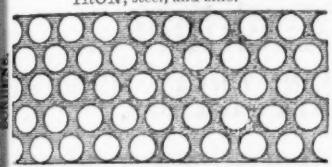
NEWPORT, MON.

Agents for the six Northern Counties—
TANGYE BROTHERS, ST. NICHOLAS BUILDINGS,
NEWCASTLE-ON-TYNE.

[This Advertisement appears fortnightly.]

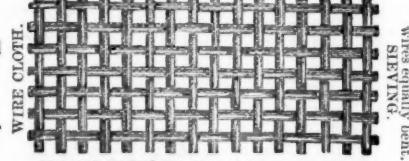
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Millimeter holes perforated in sheet-copper, brass,
IRON, steel, and zinc.

CERTIFICATE OF MERIT

Awarded by the
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SIEVES AND GRATES,
Shown at the Annual Exhibi-
tion, 1879.

Lineal holes per inch woven in copper, brass,
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STRONG WEB, THE CROSS
WIRES EQUALLY BENT.

JIGGER-BOTTOMS AND CRUSHER SIEVES.

Manufacturers of Stamps-Grates, Sieves, and Riddles, for Mining and other purposes, by Self-acting
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SPECIALITY.—Thick Copper, Brass, Zinc, and IRON Perforations, Classifying-Sieves,
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Picks, Shovels, Rakes, Riddles, Skips, Blowing Tools, Pit Tubs, Crucible Cast Steel
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Springs, Chains and Traces, Harness, Files, Lifting Jacks, Crabs, Cranes, Pulley
Blocks, Pit and other Rails, Screen Bars, Air Pipes, Brattice Cloth, Gas Steam and
Water Pipes, Loco Tubes, Smiths' Hearths complete, Smiths' Tools, Powder Magazines
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NEAR VICTORIA STATION, MANCHESTER.

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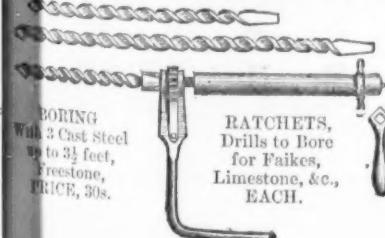
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Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper
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Shipping Orders Executed with the Greatest Dispatch.

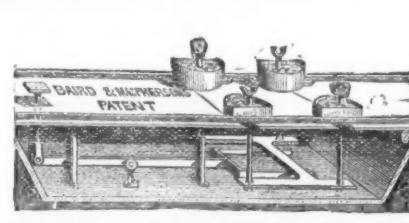


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Depot for Colliery Specialities: B67, ROBERTSON STREET,
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RATCHETS,
Drills to Bore
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Limestone, &c.,
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BAIRD'S IMPROVED
SOLID MOULDED
GUITA PERCHA
PUMP BUCKETS,
Price, 3s. 9d. per lb.



BAIRD AND MACPHERSON'S PATENT TUB GREASER.

SOLID DRAWN BRASS AND COPPER
BOILER TUBES,FOR LOCOMOTIVE OR MARINE BOILERS,
EITHER

MUNTZ'S OR GREEN'S PROCESS.

MUNTZ'S METAL COMPANY (LIMITED),
FRENCH WALLS,
NEAR BIRMINGHAM.SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC
1872 AND 1876.

THE WELL-KNOWN PATENT SELF-ACTING ORE
DRESSING MACHINERY, as in operation at most of the
large Mines in the Kingdom and Abroad, is now supplied solely by
THE PATENTEE AND MANUFACTURER, MR. GEORGE GREEN,
Mining Engineer, AT GREATLY REDUCED PRICES; also all
descriptions of Mining Machinery, including
GOLD AND SILVER AMALGAMATING MACHINERY, complete
Stamp Mills, Water Wheels, Steam Engines, &c.

ROLLER SHELLS FOR CRUSHING MILLS—a speciality.

SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSIT.

Prices and particulars on application to the Manufactory,
ABERYSTWITH, SOUTH WALES.THE SELF-ACTING PORTABLE ORE-DRESSING
MACHINE COMPANY,
ABERYSTWITH.THESE MACHINES are constructed to meet the requirements of
Mountainous Districts, where the transmission of heavy ma-
chinery is unpracticable, and Mines worked on a small scale.The Machines are complete in themselves, and require no masonry
or any other foundation, and can be driven by either steam or water
power.

Estimates and full particulars on application, as above.

IMPROVED ECONOMIC ORE-DRESSING
MACHINERY.MESSRS. W. NANCE AND CO. beg to call attention to their
IMPROVED ORE DRESSING MACHINERY.

IMPROVED CRUSHING MILL, combining the "Marson Patent Ston
Breaker" with the "Improved Cornish Crusher," reducing the hardest rock to
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proved air-cushioned jiggers automatically, and also delivering the fines auto-
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and 99 per cent. of the ore wasted under the old system, and is at the same time

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Improved Air-Cushioned Piston Jiggers and Vanning and Percussion Tables
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Inspection of Mines at home and abroad. French and German spoken.

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on the Cause, Consequence, and Treatment of certain forms of Debility,
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Noises in the Head and Ears, Impaired Sight and Memory, Indigestion, Pains in
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Gold Medal, Silver Medal, and Honourable Mention awarded at the Paris Exhibition, in competition with all the World,
FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

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PULVERISERS,
BONE MILLS,
MORTAR MILLS,
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Improved Patent Stone Breakers & Ore Crushers.

ROYAL SHOW, CARLISLE, JULY 12 TO 16. STAND 208.
MACHINERY IN MOTION—STONE-BREAKERS, ORE CRUSHERS, CEMENT CRUSHERS, PULVERISERS, BONE MILLS, &c.

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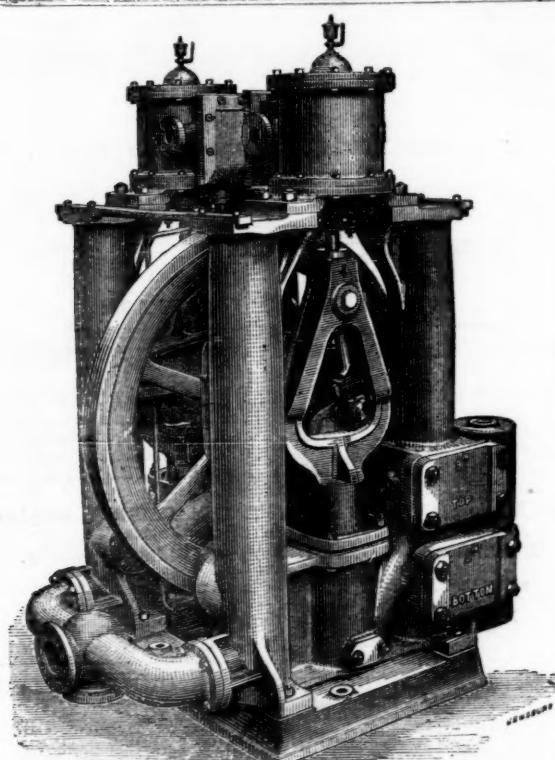
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STEAM PUMPS for COLLIERY PURPOSES, specially adapted for Forcing Water any height; also for Sinking; and for Feeding Boilers.

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New Patent Brick-making Machine

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It makes two bricks at once, and will make 12,000 to 14,000 plastic pressed bricks per day, hard enough to go direct to the kiln without drying; or it will make the bricks thoroughly plastic if required. For works requiring a machine at less cost the machine is made to turn out one brick at once, and is capable of producing 3000 bricks per day.

The Machine can be seen at work daily at the Brickworks of the Patentees, JOSEPH FIRTH AND SONS, WEBSTER HILL, DEWSBURY, as also their Patent Gas Kiln for Burning Bricks, which possesses the following amongst other advantages, viz.—Economy in Fuel, Rapidity and Quality of Work, even Distribution of Heat, and Total Consumption of Smoke.

[See Illustrated Advertisement every alternate week.]

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Simple, strong, and giving most excellent results, and ELECTRIC BLASTING APPARATUS.



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FULL PARTICULARS AND PRICES ON APPLICATION.

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EDGE TOOLS, HAMMERS, PICKS, and all kinds of TOOLS for RAILWAYS, ENGINEERS, CONTRACTORS, and PLATELAYERS.
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